

# MEDICAL ELECTRONICS NEWS



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VOLUME 1—NUMBER 4

DECEMBER 1961

## Biomedical Electronics Program at Iowa State University

VICTOR W. BOLIE, WARREN B. BOAST, ROBERT GETTY, MELVIN J. SWENSON

A COMPREHENSIVE academic training and research program in biomedical electronics was initiated at Iowa State University in 1957. In four years, this interdisciplinary program has been broadened and refined and has acquired substantial state and federal financial support. Graduate students are enrolled in the training program, various research projects are being pursued, and a \$407,500 specialized laboratory building for biomedical electronics is approaching completion.

Among the early measures taken to facilitate exchange of technical information between medicine and engineering was a special arrangement made in the fall of 1957 to permit a staff member of the Department of Electrical Engineering to complete courses in biochemistry, anatomy, and physiology. In

Abstracted in part from a paper presented at AIEE Great Lakes District Meeting, Minneapolis, Minnesota, April, 1961.

addition, several interdisciplinary projects were sponsored to strengthen the cooperation between engineers and veterinarians in the laboratory. These included experiments such as the determination of the minimum electrical energy for sciatic nerve stimulation, a comparison of the relative merits of single-ended and differential amplifiers for recording biological potentials, a determination of the major sources of electrical interference with and without a screened room, and the design of an ultrasafe and simple cardiac defibrillator.

The results of initial efforts were so encouraging that the program was enlarged.

Dr. Bolie is Chairman of Biomedical Electronics, Iowa State University.

Dr. Boast is Head of the Dept. of Electrical Engineering.

Dr. Getty is Head, Dept. of Veterinary Anatomy.

Dr. Swenson is Head, Dept. of Veterinary Physiology and Pharmacology.

It was realized in early 1958 that financial assistance would be required if the program's evolution were to continue. State and federal funds were requested.

The results were (a) \$8330 from the National Science Foundation to cover the salary and expenses of a Senior Postdoctoral Fellowship, which permitted the chairman of the program (an electrical engineer by previous training and experience) to acquire an additional graduate degree in physiology at the Stanford University School of Medicine, (b) \$23,000 per year from the National Institutes of Health to cover special research projects in medical electronics, such as the refinement of medical transducers and the development of a systematized radio-telemetering system for transmitting stimuli and recording physiological data, and (c) \$400,000 from the State of Iowa and the National Institutes of Health for the construction of a "medical electronics instrumen-

## Dear Reader:

Hospitals are using computers and data handlers in many different ways. We will report the specific information in a forthcoming issue of **MEDICAL ELECTRONICS NEWS**. Meanwhile, our readers can facilitate this survey by replying to the following questions.

- We are using computers for the following biomedical applications:

No. & Type: \_\_\_\_\_

Applications: \_\_\_\_\_

- We are using data logging equipment for these applications:

No. & Type: \_\_\_\_\_

Applications: \_\_\_\_\_

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## LETTERS TO THE EDITOR

Editor, MEN:

I have read with interest your article in the September 1961 issue, in which I feel the listing of my name as having prepared a proposal for biomedical engineering training may lead to some misconceptions as to the state of the program at Columbia University.

I hope that it can be made clear that there is at this time no organized training program in the field here at Columbia, but I hope that with time something of this nature may well be placed on a more formal basis. I have referred all applicants who have written to me for such training to Drexel Institute, University of Rochester, Johns Hopkins, or the University of Pennsylvania.

Hans H. Zinsser, M.D.  
Associate Professor, Clinical Urology  
Columbia University  
College of Physicians and Surgeons  
New York 32, N. Y.

Editor, MEN:

We are working under a USPHS grant (#W-170) and the area of our research is the operating room suite and post-operative recovery room. Your material is therefore of great interest to us.

Robert Hyde Jacobs, Jr.  
Chief Investigator  
Office of Hospital Research  
New York Chapter,  
American Institute of Architects  
New York 19, N. Y.

Editor, MEN:

In the September issue, page 4, there is a listing of instruments in use at Memorial Hospital, Long Beach, California. Figure 4 shows our Model AG Bovie Electrosurgical Unit, but this is referred to under the listing of "equipment and name of manufacturer" as an electronic surgical knife, the manufacturer's name—Birtcher. The Birtcher Company manufactures electrosurgical units, but the name "Bovie" belongs to our equipment, and the unit shown in figure 4 is our Model AG Bovie Unit and not a unit made by the Birtcher Company. We thought you would like to have this brought to your attention.

W. J. Dieckman, Manager  
Customer Service  
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Editor, MEN:

We have a new cardiopulmonary fitness testing laboratory and shall be using exercise stressors, collecting and analyzing expired air, strength testing, and assessing bone and adipose tissue. I am particularly interested in contacting firms which produce (1) analytical mass spectrometers, (2) anthropometrical instruments (fat calipers, goniometers, tapes, etc.), (3) dynamometers, and (4) valves, solenoids, tubing, flow meters, etc., for expired air collection and measurement, to mention a few things.

I would like to receive any information on instrument buying guides.

Joseph A. Mastropaolo, Ph.D.  
Cardiopulmonary Fitness Testing  
Laboratory  
Board of Health  
Chicago 10, Illinois

Editor, MEN:

Excellent publication and long needed.

Dr. Harold Laufman  
Assoc. Professor of Surgery  
Northwestern University Medical School  
Chicago, Ill.

## MEDICAL ELECTRONICS NEWS

Instrumentation, Electronic and Electromechanical Devices for use in Biomedical Research; Diagnosis and Therapy; Radiology; Air Pollution, etc.

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Each issue will reach over 40,000 doctors and technicians active in clinic and hospital research, medical and biological research institutes, medical schools, public health research laboratories, therapy, air pollution, etc.

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### ISSUANCE AND CLOSING DATES

Published quarterly in March, June, September and December. Last forms close on 1st of month of publication. In 1962, Medical Electronic News will appear bi-monthly.

### EDITORIAL FUNCTION & SCOPE

Medical Electronics News will provide a means whereby the results and techniques of the instrumentation and electronics specialties can be made more generally available.

As part of its editorial scope, each issue will report the new instruments, new techniques, and new developments in the field of instrumentation and electronics.

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Continued from page 1

tation research building," which adds approximately 12,000 square feet of laboratory space to the research facilities.

Since its inception, the biomedical electronics program has been administered equally by the College of Engineering and the College of Veterinary Medicine. This applies to the expenses of teaching staff, equipment, laboratory facilities, animal maintenance, and research projects.

A special curriculum in biomedical electronics is not offered for the baccalaureate degree. The undergraduate is encouraged to elect additional courses in physics, mathematics, electronics, anatomy, physiology, chemistry, and biology to supplement basic training in his field of study. Some of the courses for graduate students in biomedical electronics are:

**Anatomy for Biomedical Electronics**—Macroscopic and microscopic anatomy using the dog as a pattern animal, emphasizing an engineering point of view.

**Physiology for Biomedical Electronics**—Mammalian physiology from an engineering point of view. Functional studies of neural and chemical regulatory processes, using the dog as the pattern animal. Mathematical problems in circulation, respiration, metabolism, acid-base balance, and neuromuscular and autonomic functions.

**Bioelectronics**—Design of transducers, amplifiers, and recorders. Use of oscilloscope in animal experiments for studying waveform and bandwidth requirements. Techniques for suppressing noise and interference.

**Biomedical Electronics**—Advanced electronic designs for biomedical measurements. Applications of information theory, electronic computers, and advanced servomechanism concepts to the study of biological systems and medical automation. Theories of the perceptron and other self-organizing information systems.

**Quantitative Experimental Physiology**—Advanced theory and methods of experimental mammalian and avian physiology, with emphasis on the inter-play between fundamental life processes and the basic laws of physics, mathematics, and chemistry. Functional alterations by chemical and surgical procedures. Use of advanced electronic, chemical, and bioassay techniques. Practice in mathematical descriptions of physiological phenomena.

The research portion of the program applies the technical knowledge of the members of all the co-operating departments to develop and refine instruments for making biomedical measurements as well as utilizing electronic means in therapy and diagnosis.

Data to be obtained in the near future will include correlation and evaluation of neuroanatomical and neurophysiological findings on a quantitative basis employing electronic methods. Biological measurements of the aging process and more exact recordings of numerical values in physiology will be forthcoming. After these data have become established, one can then gain the benefits of better teaching through more vivid and exact descriptions of biological processes.



# READER INQUIRIES

Please refer to Inquiry Numbers  
when answering Reader Inquiries.

## Gastric and Duodenal pH

Professor of medicine wishes to measure gastric and duodenal pH simultaneously (1-9) by small indwelling cell and tubes to study peptic ulcers and pyloric function. M-101

## Blood Flow

Physician in cardiovascular lab of hospital wishes to measure blood flow during cardiac catheterization for clinical and research purposes. M-102

## Vibration Amplitude

Engineer in medical college wishes to measure peak-to-peak vibration amplitude of ultrasonically driven tool of  $\frac{1}{8}$ " dia at end of long flexible shaft, used in remote drilling of kidney stones. M-103

## Middle Ear Surgery

Physician requires photographs, motion pictures, and closed-circuit TV of surgical procedures performed in middle ear under operating Zeiss microscope. M-104

## Carrier Mobilities in Anthracene Crystals

Physicist in university department of radiology wishes to measure carrier mobilities in anthracene crystals under irradiated conditions. The electron and hole mobilities, and the carrier lifetimes when irradiated with X-rays are desired. M-105

## Mechanical Tube Rotator

In one of my laboratory tests I find it necessary to take a stoppered 4" by  $\frac{1}{2}$ " tube and rotate it 90° for 5 minutes. Have you any suggestions of any device that will act as a substitute for human hands, which will be able to hold a dozen or more tubes? M-106

## Lip Pressure

Doctor of dental surgery at university wishes to measure pressure on front teeth from lips while musical instruments are being played, in order to measure possible tooth movement. Pressures to 45 psi are possible. Presently using transducer ( $\frac{1}{2}$ " sq) with electronic amplifier (reactance bridge). M-107

## Foreign Bodies in Tissues

Physician wishes to locate foreign bodies, such as broken needles, in body tissues at depth of 1" to 2". Now using X-ray. M-108

## Small Freezer

Pathologist in clinical lab needs a  $1\frac{1}{2}$ -cu-ft freezer. M-109

## Diagnosis of Electrical Impulses

Electronic technician in industry wants to measure input sensitivity below 15-mv range and below 2 cps in diagnosis of electrical impulses, from dc to 2 cps,  $\mu$ v to mv. Presently using narrow band spectrum analyzers. M-110

## Intracranial, Skin, and Subcutaneous Temperatures

Professor of pharmacology wishes to measure intracranial, skin, and subcutaneous temperatures (20°-45°C) by method other than thermocouples. M-111

## Pulse Rate and Magnitude

Engineer for instrument manufacturer wishes to measure pulse rate and magnitude by strain-gage-type pickup for critical-patient monitoring. M-112

## Paravertebral Temperature

Chiropractic physician is interested in paravertebral temperature measurement of skin surfaces to determine nerve inflammation. M-113

## Pressure in Animal Eyes

Lab biochemist wishes to measure pressure (0-75 mm Hg) within eyes of animals. M-114

## Tension, Pressure Recording

Professor of physiology is interested in biochemical recording of tension, pressure, etc. at research and student lab level. M-115

## Implanted Sensors

Senior technical adviser of firm seeks miniature implanted transmitters and sensors for physiological use. M-116

## Differential Amplifier

Chief investigator of research facility at hospital needs differential amplifier, a-c coupled, with response (3 db down) from 1000 cps to 1 Mc. M-117

## Recording pCO<sub>2</sub>

Director of experimental surgery lab wishes to continuously read and record pCO<sub>2</sub> of blood in open-heart surgery. M-118

## Sterilization

Supervisor of hospital central supply seeks information on thermometer sterilization technique by method other than "cold" (solution) sterilization. M-119

## Drop Counter and Ratemeter

Medical-electronics engineer in university department of pharmacology needs low-speed drop counter (500 cpm) with ratemeter; both to have d-c analog output to two significant figures. M-120

## Continuous Indirect BP

Director in army medical research lab wishes to measure continuously and indirectly blood pressure of humans in work situations. M-121

## Blood Viscosity

Director of hospital hematology department, in study of abnormal hemoglobin, wishes to measure variable blood viscosity in changing O<sub>2</sub> tension. Now using point of gel formation. M-122

## Demineralizer

Researcher in medical school seeks demineralizer producing 10-50 gpd of deionized water. M-123

## Systolic and Diastolic BP

Director of anesthesia research in university hospital wishes to measure blood pressure (systolic and diastolic), using a topical sensing device. M-124

## Arterial BP

Design engineer in electronics company wishes to measure arterial blood pressure dynamically and indirectly for surgical instrumentation; range 40-200 mm Hg. M-125

## Urinary Steroid Hormones

Chief biochemist in hospital research lab wishes to measure urinary steroid hormones. Now using column and paper chromatography. M-126

## Dilation of Uterine Cervix

Physician wishes to measure dilation (3-9 cm) of uterine cervix in obstetrics, following course of labor. M-127

## Oxygen in Vivo Measurements

Biophysicist in hospital wants to measure oxygen in vivo in physiology applications. M-128

## Radiology

Research physicist in university radiology department wishes to measure low (less than 2R) X-ray dose in 30-100 kw energy range in phantoms. M-129

## Light Measurement

Scientist in chemical research wishes to measure brightness levels of projected light from a screen. M-130

## Volume Differential Transmitter

Research physiologist needs a differentiator to differentiate a volume signal to yield flow. M-131

## Suspendable Particle Spheres

Chief of hematology in aeromedicine research institute needs suspendable particle spheres of 6  $\mu$  ( $\pm 1 \mu$ ) dia for calibrating. M-132

## Detection of Tranquilizers

Doctor on medical staff of life insurance corporation wants to measure urinary breakdown products of drugs used for hypertension in order to detect drug usage. Range required: 0.001 to 10 mgm %. M-133

## Ultrasonic Emulsification

Professor at university seeks transducers for ultrasonic emulsification in range of 20-25 kc. M-134

## BP during Hypothermia

Private physician wishes to measure blood pressure during hypothermia in anesthesia. M-135

## Tension, Pressure Recording

Associate professor of physiology is interested in bio-medical recording of tension, pressure, etc., at research and student lab level. M-136

## X-Y Recorder

Director of cardiac research seeks special X-Y Recorder for paired signals. M-137

## N<sub>2</sub> and He in Mixture

Physician engaged in naval medical research institute wishes to measure % N<sub>2</sub> and He in mixed He, N<sub>2</sub>, O<sub>2</sub> and CO<sub>2</sub> gas. M-138

## O<sub>2</sub> and CO<sub>2</sub> Analyzers

Professor of research in college of dentistry desires information on gas analyzers to sample O<sub>2</sub> and CO<sub>2</sub> in closed chambers where small lab animals are kept. M-139

## Insect Blood Volume and Osmotic Pressure

Professor of entomology wishes to measure osmotic pressure, temperature, and volume of insect blood in action studies. Samples measure 1-10  $\mu$ l. M-140

## Flow in Heart-Lung Machine

Surgeon in clinic wishes to measure flow through arterial line of heart-lung machine. Line is  $\frac{1}{4}$ " or  $\frac{3}{8}$ " Tygon. M-141

## Amino Acids in Blood

Scientist in biochemical institute doing research in disease susceptibility wishes to determine all amino acids in 5 cc or less of blood. M-142

## Time-Temp Dosimeter

Health Engineer in oil refinery needs time-temperature dosimeter for heat-stress studies in man in range of 85° to 115°F. M-143

## Telemetry Multiple Variables

Professor of physiology wishes to telemetry multiple (10-30) physiological variables (EEG, ECG, and fluid pressures) from unrestrained rat (no wires). M-144

## Radiation Probe

Civil engineer working for state department of water resources needs a probe to place in liquid for determining alpha, beta, and gamma radiation levels. Presently using proportional gas counter. M-145

Inquiries continue on page 24



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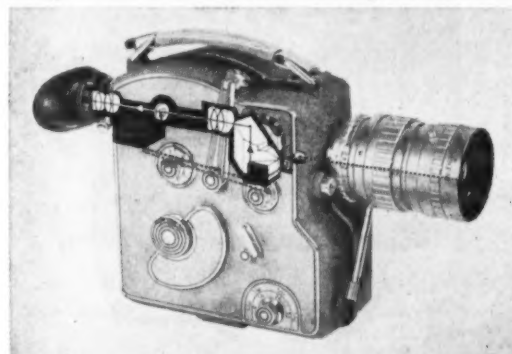
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CIRCLE 2 ON READER-SERVICE CARD

## Slitlamp Cinematography of the Angle of the Anterior Chamber of the Eye

Motion picture photography provides a most effective aid for studying the development of goniosynechia, as well as for maintaining records of gonioscopic findings in general. The technical difficulties involved in slitlamp cinematography have been met successfully, for the first time, by coupling the Camex-Reflex 8mm camera parafocally with the illuminating system of the Haag-Streit Model 900 Slitlamp.

Difficult as it is to study the angle visually, it is far more difficult to obtain a satisfactory photograph of it. The angle must be viewed either through a thick contact



lens, which distorts the image, or indirectly by means of a contact lens mirror, which not only introduces numerous adventitious reflections but also complicates the task of illuminating the field. The angle also presents a relatively great extension in depth. An appreciation of the third dimension is essential to the evaluation of details.

A number of photographic methods have been explored and described. It became apparent that consistently satisfactory results could be achieved only with a through-the-lens method of focusing. To make motion picture photography of the angle feasible and practicable, it was necessary to bring the camera close to the patient, and to utilize both the illumination and the mobility of the slitlamp. At this short working distance it is not possible to fill a 16mm frame with the image of the portion of the angle visible in the gonioscopic mirror, but this becomes possible when 8mm film is used. The Camex-Reflex is the only 8mm movie camera which comes under consideration since it makes provision for the use of an extension tube and also features a through-the-lens focusing system. The Haag-Streit Model 900 Slitlamp was found to be especially well suited for photography with the Camex. By experiment it was found that a 50mm telephoto lens, mounted in the adjustable extension tube, provides the desired focal length which permits the camera to be mounted at the same distance from the patient as the slitlamp microscope. The visual magnification of the viewing system of the camera is 15 to 18 diameters . . . (Abstract from "Slitlamp Cinematography of the Angle Chamber" by Adolph Posner, M. D., New York; Eye, Ear, Nose & Throat Monthly, Vol. 40, p. 277, April, 1961)

FOR MORE INFORMATION ON THE CAMEX-REFLEX (KARL HEITZ, INC., 480 LEXINGTON AVE., NEW YORK 17, N. Y.) CIRCLE 44 ON READER-SERVICE CARD



# Automatic Time-Lapse Electrocardiography for Long-Term Monitoring of the Fetal Heart

ALFRED N. MARSHALL, M.D., F.A.C.O.G., and FRANK SHUBECK, M.D.

Electrocardiography affords one of the few practical means for continuous monitoring of fetal heart activity. Time-lapse electrocardiography is a method by which fetal-ECG tracings are taken automatically at preset intervals for specific periods. Continuous monitoring at the standard speed of 25 mm/sec requires over 3600 inches of recording paper per hour. By the time-lapse method, on the other hand, sampling the heart for 4 consecutive seconds every 10 minutes requires less than 25 inches of paper per hour.

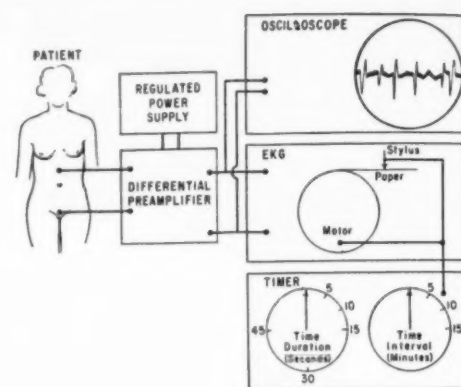
The equipment for time-lapse electrocardiography includes: a Model LPS-041 regulated power supply (Argonaut Associates, Inc., Beaverton, Ore.); a Model LRA-042 differential preamplifier (Argonaut Associates, Inc.); a Model 572 electrocardiograph (Sanborn Co., Waltham, Mass.); a Type 504 oscilloscope

From the Department of Obstetrics and Gynecology, University of Oregon Medical School Hospitals and Clinics and Good Samaritan Hospital, Portland. This study was partially assisted from a grant from The Diabetes Foundation of Portland, Ore.

(Tektronix, Inc., Beaverton, Ore.); a timer (fabricated in the Electronic Shop, University of Oregon Medical School).

Time-lapse electrocardiography for extended periods is a workable means of monitoring a possibly compromised fetus. In one case, monitoring a severe diabetic patient revealed a decrease of the fetal heart rate in utero to 100-110 per minute for 3 hours, this coming 4½ weeks before term. Because a persistent rate below 110 for 3 hours was taken as evidence of true fetal distress, a cesarean section was performed and a severely ill baby was delivered. The baby responded to treatment and lived.

This case suggests that death of the fetus in diabetics is not sudden but has a definite, recognizable premonitory period which may be manifested by a moderate but persistent and progressive slowing of heart rate. Diabetics with or without a history of previous preterm fetal death are candidates for time-lapse monitoring. Data derived from this method may



contribute materially to a decision to terminate a pregnancy earlier than full term or even than the accepted 36-37 weeks in diabetics.

Certain details of technic need improvement: (1) those having to do with decreasing patient discomfort—skin irritation, immobilization, and psychological vexation; and (2) those having to do with filtering and improving the electronic signal. (*Abstracted from "Obstetrics and Gynecology," Vol 18, No. 3, Sept., 1961.*)

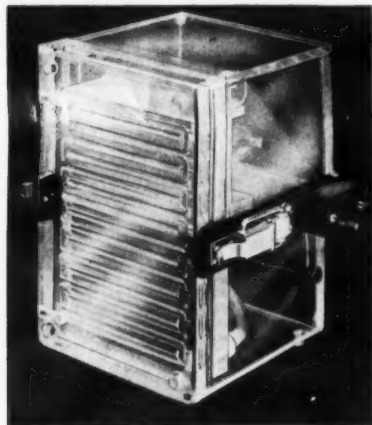
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## BRIEFS

FOR MORE DATA, CIRCLE NUMBER ON CARD.

### Vertical Gel Electrophoresis

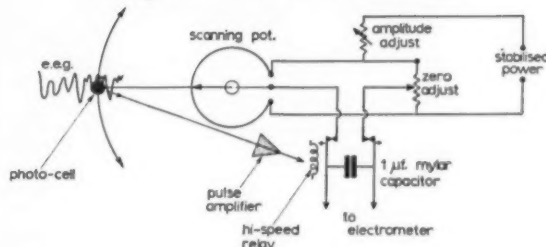
Electrophoresis on gel supporting media affords much improved resolution in comparison with paper-strip or free-solution electrophoresis. As many as 24 distinctly-separated components can be obtained from serum sam-



ples. Although equally suitable for micro quantities, gel electrophoresis also accepts much larger quantities making it a practical method for preparative separations on a semi-micro scale; up to 200 mg of protein mixture can be separated on one gel slab. If direct-contact cooling of the gel slab is employed, complete serum protein patterns can be obtained in less than two hours, showing better resolution than a 20-hour pattern on paper electrophoresis. . . . (From new brochure, E-C Apparatus Co., 538 Walnut Lane, Swarthmore, Pa.)

FOR THIS LITERATURE CIRCLE 48 ON READER-SERVICE CARD

### Digital EEG Records



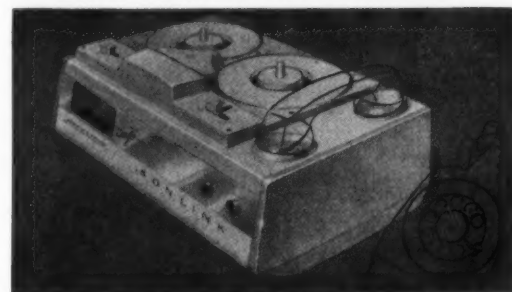
The use of procedures to convert electroencephalograph (EEG) patterns into quantitative data has occupied the attention of workers for a quarter of a century. . . . In view of the more complex methods of analysis made available by digital computer techniques it was decided to attempt to build a device which could automatically convert a standard 8-channel EEG record into digital form. . . . It is broken down into several interconnected units.

The scanning heads consist of eight photoelectric cells. . . . each is mounted on a plexiglass strip, which is fixed to the spindle of a potentiometer so that the deflection of the photocell at the time it crosses the trace is converted to a voltage change. . . . There are eight pairs of potentiometers, each pair is in a Wheatstone bridge circuit and all fed from a regulated power supply. . . . The output of the amplifier feeds a Non-Linear Systems digital voltmeter. This voltmeter feeds a Clary printer and punch. . . . When the digital voltmeter has read out the required number of channels, the stepping switch moves to its next position and causes a relay to close. . . . (From 4-page reprint, "An Automatic Device to Convert Electroencephalograph Records into Digital Form," Michael G. Saunders, M.D., *Electroenceph. clin. Neurophysiol.*, 1961, 13:471-474.)

FOR MORE INFORMATION ON DIGITAL VOLTMETER (NON-LINEAR SYSTEMS, INC., BOX 728, DEL MAR, CALIF.),  
CIRCLE 49 ON READER-SERVICE CARD

FOR MORE INFORMATION ON PRINTER AND PUNCH (CLARY CORP., 408 JUNIPERO ST., SAN GABRIEL, CALIF.),  
CIRCLE 50 ON READER-SERVICE CARD

### ECG Data Transmission



Sonlink Console Model TRM-20 combines in one portable unit a Sonlink receiver, transmitter, electrocardiogram tape recorder, and oscilloscope monitor. . . . It receives electrocardiogram data by phone from any number of patients equipped with Sonlink transmitters, makes a magnetic tape record of the ECG along with voice identification, transmits electrocardiograms by phone from the magnetic tape record or from electrocardiograph machine to any physician having a Sonlink receiver. . . .

Sonlink allows the physician to send ECG to any other physician anywhere in the world. . . . Sonlink can also be used for constant monitoring of seriously ill patients. . . . (From 4-page Interim Bulletin, Mnemotron Corp., 45 S. Main St., Pearl River, N. Y.)

FOR THIS LITERATURE CIRCLE 52 ON READER-SERVICE CARD

### Chromatography Refractometer

The chromatography of colorless compounds has long been burdened with tedious methods of fraction collection and estimation. Various analytical techniques such as ultraviolet, infrared, colorimetric and refractometry have been adopted in an effort to obtain continuous flow-



ing chromatographs which would greatly simplify fraction collection and analysis. An instrument which would continually monitor the refractive index of the column effluent has always appeared to be the most desirable for this application.

Refractometry has always had appeal as a continuous monitor for liquid chromatography columns because refractive index is to liquid chromatography as thermal conductivity is to gas chromatography. . . . The Waters Associates Differential Refractometer. . . . is capable of detecting extremely small concentrations in the order of a few hundredths of a milligram. A continuous flowing reference cell is used. The water cooled optical bench allows operation at 25°C. Refractometers of this type have been provided to several companies and are presently being used to run flow chromatograms. . . . (From 12-page bulletin, Waters Associates, 45 Franklin St., Framingham, Mass.)

FOR THIS LITERATURE CIRCLE 53 ON READER-SERVICE CARD

### PHYSIOLOGICAL RECORDER

## THE PHYSIOGRAPH

TEACHING / RESEARCH



- SIMPLICITY • VERSATILITY
- RELIABILITY

- ★ Advanced Modular Design
- ★ Ease of Operation
- ★ Variety of Transducers

- EKG, EEG, EMG • Pulse
- Blood Pressure • Others
- Muscular Action

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E & M INSTRUMENT CO., INC. / AIR-SHIELDS, INC.

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CIRCLE 3 ON READER-SERVICE CARD

### CLEARING HOUSE

To assist—1. Organizations in need of personnel experienced in biomedical instrumentation and electronics.

2. Personnel seeking positions in the biomedical instrumentation field. . . .

Medical Electronics News is organizing a file of available positions, and qualified personnel.

If your organization has openings, please send your specifications to Clearing House, Medical Electronics News, 845 Ridge Ave., Pittsburgh 12, Pa.

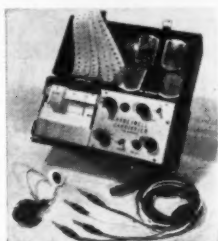
If you are interested in working in this field, send your resume (giving your qualifications) to the above address.

You are also invited to present your offer or qualifications, through an advertisement in the "Clearing House" section of M-E-N. Cost is low—only \$2 per agate line; minimum of 5 lines.



## NEW PRODUCTS

### 9-LB ELECTROCARDIOGRAPH



New 9" by 4 1/2" by 7" Cardioview provides all essential facilities of full-size ECG, is "most-miniaturized ever developed." Accessories housed in lid of carrying case include patient leads, electrodes, electrode jelly and spare chart. Built-in sealed battery provides 4 hours of continuous recording without recharging, equivalent to approximately 48 patient investigations. Three recording speeds are available: 25, 55, and 5 mm/sec.—Minneapolis-Honeywell, Heiland Div., 5200 E. Evans Ave., Denver 22, Colo.

CIRCLE 54 ON READER-SERVICE CARD

### TORQUE MEASURING



New Torque Measuring Apparatus for testing leg or arm muscles of patients with spastic conditions can be set either to push or pull an arm or leg at constant speed through 150° arc, and measure torque. Two speeds available. Dual torque range: one pen records from 0 to 100 ft-lbs, one from 0 to 20 ft-lbs. Safeties prevent injury to patient.—Sage Instruments, Inc., 9 Bank St., White Plains, N. Y.

CIRCLE 55 ON READER-SERVICE CARD

### LINEAR DISPLACEMENT TRANSDUCERS



New 7DCDT Series Differential Transformer Transducers have built-in circuitry that performs functions of carrier amplifier system, eliminating need for separate oscillator, phase-sensitive demodulator, or filter. Design inherently eliminates phase-shift correction problem and harmonic and quadrature null problems associated with differential transformers. Units operate from 6-v dc, have d-c output.—Transducer Div., Sanborn Co., Waltham, Mass.

CIRCLE 56 ON READER-SERVICE CARD

### CARDIAC PACEMAKER

New Model R-101 RF Pacemaker (result of research effort by Rockefeller Institute and Yale University School of Medicine) provides remote stimulation of heart where normal physiological processes fail to maintain stable rate due to Stokes-Adams seizures. System has a source of pulsed radio frequency external to patient, electromagnetically coupled to receiver implanted within patient. Primary power source is 28-v mercury battery. Small external mercury-battery-powered voltage pack is supplied to keep unit running while battery is being replaced. Transmitter coil is encapsulated in Dow Corning's Silastic rubber and is connected to transmitter unit by length of coaxial cables. Receiving coil is fixed tuned to 2 Mc/sec by ceramic capacitor. In series with one output lead of tuned circuit is silicon diode which converts RF to half-wave rectified pulses. Coil is placed under skin and subcutaneous tissue in middle of lower sternum, allowing transmitting coil to be located axially directly above bulge in skin.—Electro-Age Corp., 611 Broadway, New York 12, N. Y.

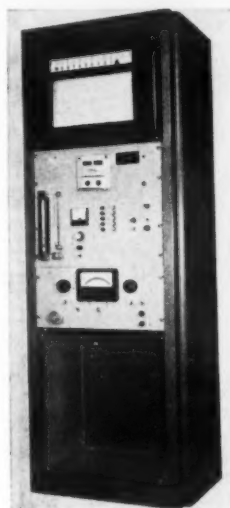
CIRCLE 57 ON READER-SERVICE CARD

### PREPARATIVE GAS CHROMATOGRAPH



New Prep/Partitioner preparative gas chromatograph separates samples of up to 10 ml, gives purer compounds faster than complex fractional distillation set-ups; recovers separated components for further study. Column supplied is made up of straight sections of 20" x 1" dia Pyrex tube connected to make 13' column (26' column is possible). Unit uses hot-wire thermal-conductivity detector that allows use of nitrogen as carrier gas.—Fisher Scientific Co., 711 Forbes Ave., Pittsburgh 19, Pa.

CIRCLE 58 ON READER-SERVICE CARD



### Continuous Carbon-14 Gas Analyzer

The Model 1200 has been designed to continuously measure small concentrations of carbon-14. It is the most suitable instrument for use in applications where measurement of the carbon-14 content of the exhaled respiratory gases, both human and animal, is desired . . . It features: sensitive rate-of-charge method, continuous chart recording, digital print-out of integrated count vs time, total accumulated activity register, metabolic enclosure, automatic flow control  $\pm 0.1\%$ , drying train, filters and alkali traps, choice of five time intervals and ten ranges, conversion for specific activity (available) . . . A specially modified Cary Model 31 Vibrating Reed Electrometer is used for detection of the carbon-14 activity in the gases of interest. The ionization chamber electrometer offers the only convenient, accurate method of measuring radioactivity of CO-air mixtures in flowing systems, as are encountered in *in-vivo* studies . . . (From new brochure and 32-page Catalog C, Baird-Atomic, Inc., 33 University Rd., Cambridge 38, Mass.)

FOR THIS LITERATURE CIRCLE 59 ON READER-SERVICE CARD

## How Ampex can help analyze life processes

*Total human system analysis is now feasible through electronics*

**Problem:** To determine the condition of a living system by analyzing relationships of body functions in many forms, including movement, pressure, flow rate, temperature, electrical potential.

**Approach:** Development of medically compatible instrumentation to retrieve, store and analyze such information, based on the latest technological developments.

**Result:** Medical research can correlate and compare every body function with a speed and accuracy not possible by any other means.

Ampex, an established leader in magnetic tape instrumentation, provides a basic key to the problems of measuring, comparing and analyzing medical data. Ampex and its equipment currently play an active role in over 150 medical research programs, including neurophysiological, psychophysiological, biochemical, electrocardiographic and cardiovascular analysis. Specific emphasis has been placed on compatibility with the latest data reduction and computing devices.

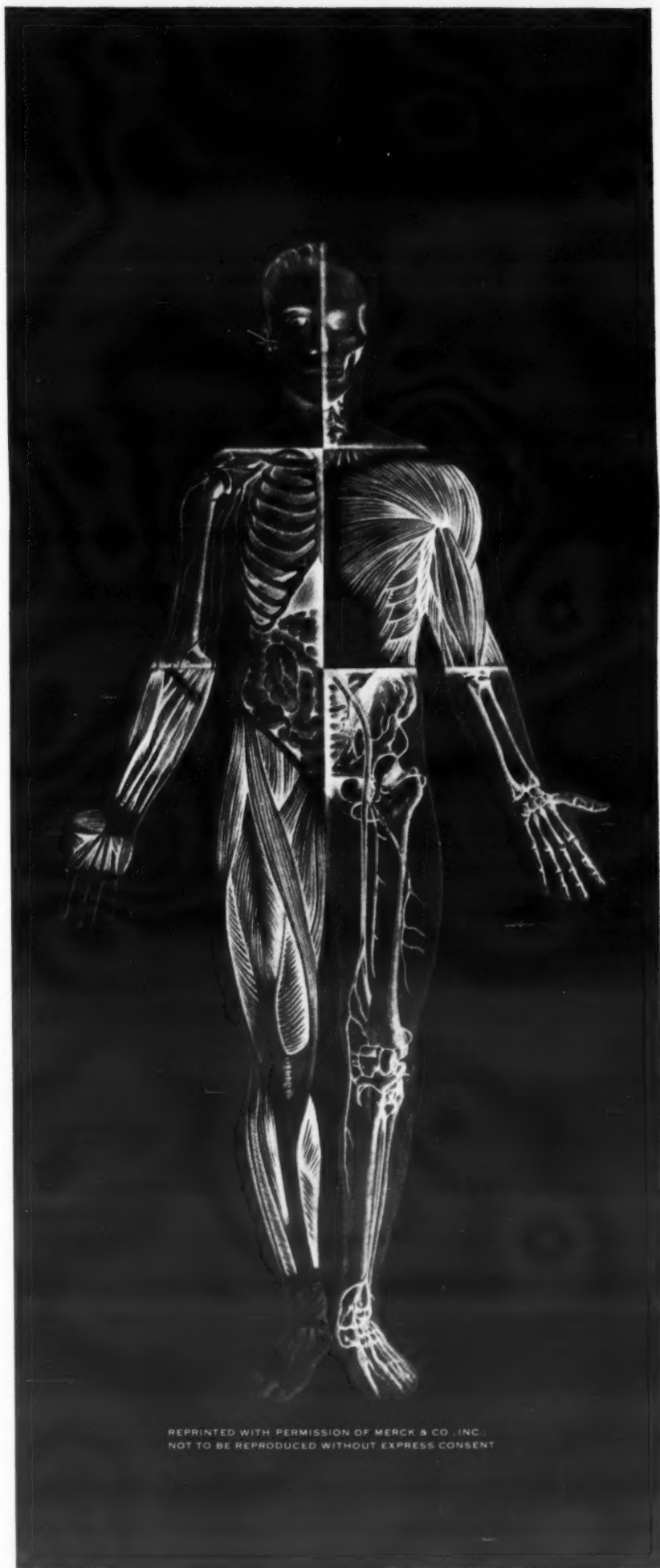
Much information on this work is now available from Ampex to help establish the common meeting ground for medicine and electronics. Write:

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PRODUCTS COMPANY

Box 5001 • Redwood City, California • EMerson 9-7111

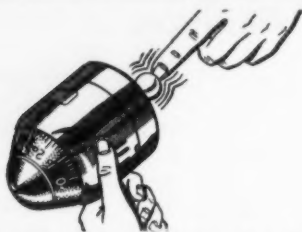
CIRCLE 4 ON READER-SERVICE CARD



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## NERVE THRESHOLD TESTING



New light-weight portable Vibrometer measures nerve threshold by increasing intensity of electrical tuning fork until perceived by patient. Testing frequency is based on 120-cps vibration. Method requires less decision by patient. Since reproducible threshold can be quantitated, trends of improvement or exacerbation can be determined.—*Electro-Medical Engineering Co., 703 Main St., Burbank, Calif.*

CIRCLE 60 ON READER-SERVICE CARD

## MAGNETIC TAPE RECORDING



New complete data recording, storage and reproducing Series 100 and 200 systems provide simultaneous record and playback on all channels (2, 4 or 8), built-in oscilloscopes (one per channel) for monitoring of input signals before and during recording, displaying of reproduce signals, circuit overload protection (up to 200 v), recording of input signals up to 200 v, input offset (permits full utilization of modulation range), selection of frequency bandwidth (from DC) and over-modulation warning indicators.—*Electro-Med-Dyne, Inc., 60 Baiting Place Rd., Farmingdale, N. Y.*

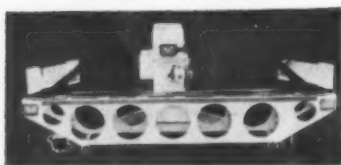
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## BIO-ANALYZER

The Bio-Analyzer, a system for continuous automatic chemical analysis, is particularly applicable to analytical procedures involving column chromatography and examination of the column effluents. Automatic control, delivery, and changing of eluting fluids in a series of columns permits operation by switching the eluting fluids during the run or by gradient elution. Fluid movement is accomplished by constant-delivery pumps or by air pressure. Reagents are continuously added to the effluent stream or to a predetermined proportion of it and, when feasible, may be quenched after measurement of their reactions. The effluent stream is continuously scanned for quantitative variations by a 3-channel spectrophotometer with choice of wave lengths and sensitivities, or by any other monitoring means such as radioactivity scanners and fluorimeters. Readings feed into a recorder for continuous graphing. The chromatographed sample can be recovered by an automatic fraction collector or by other methods suited to the needs of the laboratory.—*Research Specialties Co., 200 S. Garrard Blvd., Richmond, Calif.*

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## STEREO CAMERA

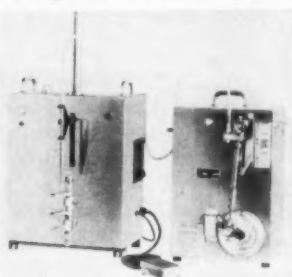


New Stereoflex Model A Camera takes 3-D pictures at up to 15,000/sec. System of mirrors adjusted along track in front of camera brings image to lenses mounted at right angles to camera's viewing axis. Two 16-mm images are recorded side-by-side on single strip of 35-mm film. Special 3-D projector reduces film speed by a factor up to 1,000.—*Benson-Lehner Corp., 1860 Franklin St., Santa Monica, Calif.*

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## SAMPLING MACHINE

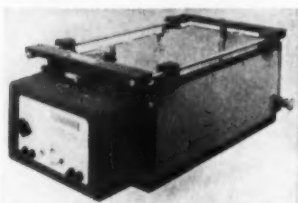
New Filamatic Sampling Machine speeds analyses by automatically aspirating measured volumes of a



series of samples and combining them with a measured volume of reagent. Operator places test tube containing the sample in a locator and depresses foot switch. Sampling Machine automatically lowers a graduated pipette into the sample, aspirates the liquid, then withdraws the pipette. To prevent contamination, the pipette automatically follows the lowered liquid level downward so that only the tip is wetted. As a further precaution, each sample is flushed from the pipette with reagent. Machine can be set to aspirate either the supernatant fluid or the residual liquid in a centrifuged sample.—*National Instrument Co., Inc., 4119 Fordleigh Rd., Baltimore 15, Md.*

CIRCLE 64 ON READER-SERVICE CARD

## WATER BATH SHAKER



New Water Bath Shaker features shaking speeds continuously variable between 50 and 200 cpm and shaking stroke that can be set at 1/2", 1", or 1 1/2". D-c motor and speed control give dependable shaking motion; epoxy lining prevents corrosion of reservoir; accessory gassing hood provides atmospheric control. Low height for bench top operation; simple depth adjustment without change of water; interchangeable trays.—*Research Specialties Co., 200 S. Garrard Blvd., Richmond, Calif.*

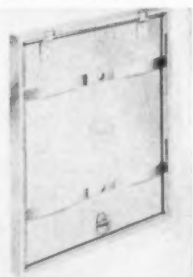
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## PBI FURNACE

New special Furnace performs dehydration and ashing operations of the alkaline ash method of protein determinations in serum. Features small size (12 3/4" w, 16" h, 10" d), self-supervising control, range selector switch and over-ride timer.—*Thermolyne Corp., 355 Huff St., Dubuque, Iowa.*

CIRCLE 66 ON READER-SERVICE CARD

## X-RAY CASSETTES



New "Standard" X-Ray Cassettes are light-weight, precision-made, economical. Units feature high-strength magnesium, epoxy enameled front; embossed aluminum back; lead lining. Stainless steel frame is hollow type, die formed and butt welded. Floating one-piece stainless steel hinges allow cover to fall gently into place to avoid marring of screens and permit expansion or contraction with temperature change. Cover has a D-shaped-ring for easy lifting. First quality oil-free felt assures excellent contact, is light-proof. Available in standard sizes, competitively priced.—*Wolf X-Ray Products, Inc., 93 Underhill Ave., Brooklyn 38, N. Y.*

CIRCLE 67 ON READER-SERVICE CARD

## DUST-FREE CABINET

New light-weight Cleanaire cabinet is constructed of clear acrylic plastic with steel fittings, is useful for research requiring reliable, dust-free environment. Standard size is 22" x 35" x 29". Filter removes dust particles down to a 0.5  $\mu$ .—*Plastigage Corp., PlastiCo Div., 915 E. South St., Jackson, Mich.*

CIRCLE 68 ON READER-SERVICE CARD

## PNEUMATIC TUBE SYSTEM

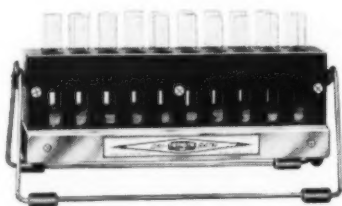


A pneumatic tube system routes medicines, test samples, diagnostic charts, routine clerical material or small instruments. Systems available for carriers are 4" round (2 1/2" I.D. by 13" length) or 4" x 7" oval (2 1/4" x 5 1/4" cross-section by 14" length). Carrier destination is coded directly onto the carrier by the sender. Dialing the coded number for the station sets up a combination of contact rings or plates. The code is automatically analyzed (like a business machine punched card) at a central control point, and appropriate deflectors are actuated to assure proper routing. Substations may be located on nursing floors, in preparation rooms adjacent to operating areas, at analytical lab rooms, in the dietician's office, the pharmacy and regular business offices.—*Airmatic Systems Corp., Assoc. of International Telephone & Telegraph Co., 441 Market St., Saddle Brook, N. J.*

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## FLUIDLESS INCUBATOR

New Type 5900 Dri-Bath, designed to incubate test specimens at a constant specified temperature, can be



used in blood banks and hematology laboratories for 37°C incubation in cross matching, serum antibody screening, Coombs test, blood typing, prothrombin time determinations and other coagulation studies. In clinical chemistry it can be used for micro determinations including amylase, lipase and phosphatases; in serology it can be used for inactivation of serum and complement fixation tests. The special self-contained control is factory set to maintain specimens (up to 2 cc volume of fluid in each tube) at constant temperature of 37°C (Series DB-5900) or 56°C (Series DB-5900-1) within  $\pm 1/2^\circ\text{C}$  of instrument setting. Two sizes are available; one accommodates ten, the other twenty test tubes up to 13-mm OD. Units are portable, require minimum maintenance, and stabilize in less than 10 minutes (13 minutes for twenty-tube model).—*Thermolyne Corp., 355 Huff St., Dubuque, Iowa.*

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## The St. Barnabas Operating Room

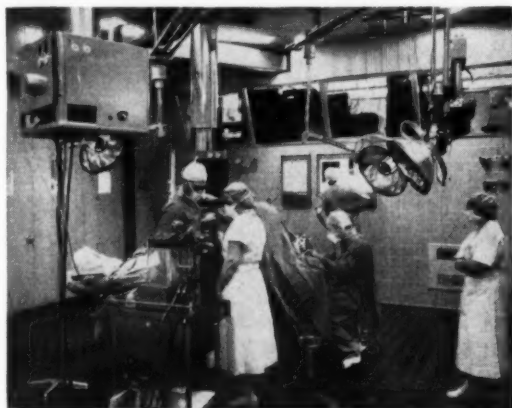
NEW YORK, N. Y.—The St. Barnabas Hospital for Chronic Diseases uses electronic equipment extensively in its Kane Surgical Center Operating Room. The complex OR was designed, engineered and installed by Invengineering, Inc., of Belmar, N. J.

Through glass panels overlooking the OR is a unique Electronics Room in which Resident Engineer, Frank Grissman, supervises the following apparatus: Recording



CO<sub>2</sub> and O<sub>2</sub> Analyzers, 8-channel Recorder-Monitor, electrocautery unit, neurological stimulation equipment, power supplies for boom and X-ray tube stand motors, X-ray remote-controlled tube stands, 8-channel EEG, complete electronic test equipment.

Below the Electronics Room, and in full view of it, is the Operating Room. It contains an 8-channel oscilloscope monitor including anesthesiologist's facility supply panel and slave CRO. The surgeon's Scott boom offers the following facilities: remotely controlled electrocautery



(controls and current outputs), warm sterile saline (thermostat controlled), X-ray tube stand positional controls which control X-ray tubes in the walls of the OR, electrostimulation connections and isolation unit, timing devices and recorder time and event marker switches, monitoring devices for ECG, EEG, etc., microphone and speaker for intercom and tape recorder.

In addition, the OR has a movie camera with integral light source for deep hole photography, a specially modified OR table with head and X-ray cassette holder, instant Trendelenburg, and attached vacuum bottles.

A 6' x 9' Kymograph on the north wall of the OR permits 2 and 4 hours of recording minute-by-minute logging and display of pulse, respiration, temperature, blood pressure, etc. Opposite, on the south wall of the OR above the doors leading into the Anesthesia Induction Room, a fixed focus 8" x 10" camera photographs the Kymographic displays for permanent record.

For more information on OR design, equipment modifications, and new instruments (Invengineering, Inc., Box 360, Belmar, N. J.), circle 71.

For more information on: CO<sub>2</sub> and O<sub>2</sub> Analyzers (Beckman Instruments, Inc., 2500 Fullerton Rd., Fullerton, Calif.), circle 72.

8-channel Recorder Monitor (Electronics for Medicine, 30 Virginia Rd., White Plains, N. Y.), circle 73.

Electrocautery unit (American Cystoscopy Makers, Inc., 8 Pelham Parkway, Pelham Manor, N. Y.), circle 74.

Neurological Stimulator (Tektronix, Inc., Beaverton, Ore.), circle 75.

8-channel EEG (Offner Div., Beckman Instruments, Inc., 3956 River Rd., Schiller Park, Ill.), circle 76.

Electronic Test Equipment (Hewlett-Packard Co., 1501 Page Mill Rd., Palo Alto, Calif.), circle 77.

Test Equipment and CRO (DuMont Labs., 750 Bloomfield Ave., Clifton, N. J.), circle 78.

Movie Camera (Neyhart Enterprises, Palos Verdes Estates, Calif.), circle 79.

OR Table (American Sterilizer Co., 2424 W. 23 St., Erie, Pa.), circle 80.



## Applications of Ultrasonic Energy

Applications of acoustical energy in the Medical/Biological field require power levels greater than those normally associated with ultrasonic equipment. In many cases the power requirements approach energy densities of hundreds of watts per square inch. The Model S-75 Sonifier is specially designed to provide such high-density acoustical power for this area of scientific research and processing . . . Typical uses include emulsification of difficult or "impossible" combinations; homogenization of cells, tissue, and body fluids; distintegration of tissues into intact cells, or of the cells themselves; dispersion of pigments and dyes; disrupting blood platelets; degassing blood and other fluids . . .

**Biological Application Notes:** Drs. William Adams and Wilson Powell of Yale University School of Medicine have been successful in making *homogenates of cells*, and have found the Sonifier particularly useful in working with volumes smaller than 1 ml. Both HeLa cells and Ehrlich Ascites cells have been treated successfully. Even though the Ehrlich Ascites cells are normally difficult to break up, the Sonifier disrupts small volumes in a few seconds at reduced power. Dr. Adams treated approximately 0.5 to 1.5 cc at a time. He reports that the Sonifier output power level switch gave him good control of degree of break-

down . . . Dr. Gerald Elkan of North Carolina State University reports extensive *disruption of Micrococci* in 15 minutes with the Sonifier. An opaque, heavy cell suspension of *Bacillus Subtilis* became completely cleared in 6 minutes of treatment. Dr. Elkan also obtained complete disruption of *Escherichia Coli* in 3 minutes . . . Staff members at a well known school of dentistry are using the Sonifier to disaggregate organisms in thick saliva. Approximately 2-ml samples are treated in a small bottle with a low power setting to permit disaggregation without disintegration. In another experiment, lactobacilli cells were not only killed, but partially disrupted. Both experiments required cooling because of heat generated by viscosity losses in the intense sound field . . . Several research groups have reported success in *disrupting chlorella*. Complete disruption usually takes place in two minutes . . . Dr. Wilhelm Frisell of the University of Colorado Medical Center has obtained total *loss of morphology in rat liver mitochondria* after 3 minutes of treatment . . . It has been reported by a supplier of carbon black that the Sonifier is excellent for *dispersing carbon black and other pigments in various solutions for electron microscopy* . . . (From bulletins S-803 and S-829, Branson Instruments, Inc., 37 Brown House Rd., Stamford, Conn.)

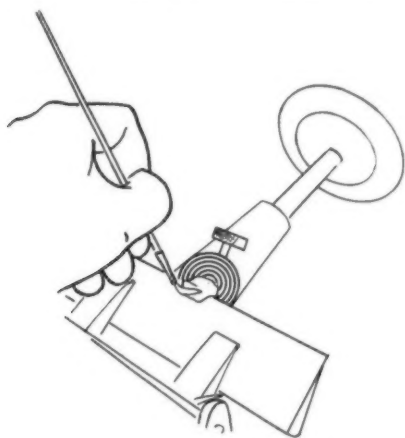
FOR THIS LITERATURE CIRCLE 81 ON READER-SERVICE CARD

### BRIEFS

#### New Simplified Technique for Frozen Sectioning

In recent years pathologists have closely followed developments in frozen sectioning procedures. Many unique applications of the cold box principle have been developed which have contributed substantially to the development of an ideal microtome-cryostat combination.

The International Harris Model CT (International Equipment Co., 1284 Soldiers Field Rd., Boston, Mass.), the most recent commercial development designed to perfect and simplify the frozen sectioning technique, consists of a rustproof Minot Rotary Microtome mounted at a 45° angle in a refrigerated chamber. The Cryostat



operates on the open top cold box principle, where (as in a super market frozen food counter) temperature remains constant with the cover open, giving the operator greater dexterity in manipulating sections.

The tissue to be sectioned is quick frozen directly to the Microtome object disc in 1½ minutes by means of a special fast freezing device incorporated into the cold chamber. The specimen is then mounted in the microtome and sectioned. A special anti-roll device keeps the specimen from curling on the blade and the flat section slides easily between the blade and the anti-roll plate. A room temperature cover slip is then applied to the section on the knife and the section immediately adheres to the cover slip. This entire procedure from fresh tissue to mounted section often takes less than 3 minutes.

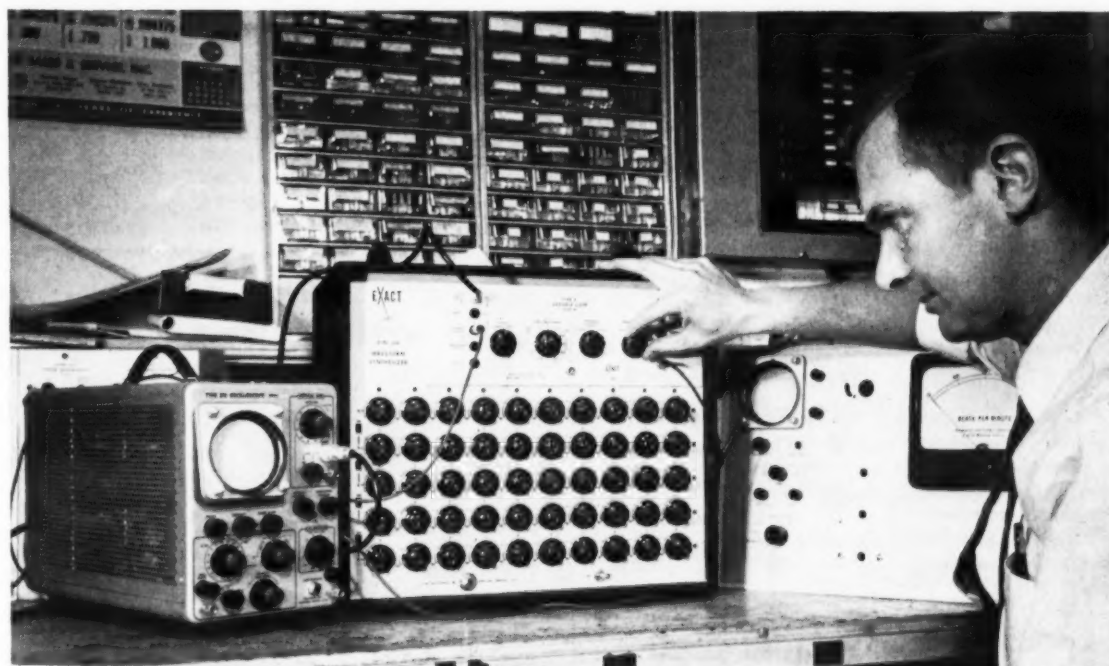
Fixation of cryostat sections is rapid and simple. A 2-10 minute immersion in chilled (+5°C) fixative is sufficient for most purposes. For rapid biopsy technique a room temperature fixative is applied for 30-60 seconds.

The ease with which one may operate the Cryostat is an essential factor and is of paramount importance when rapid sections such as surgical biopsies are to be made in minimum time. Furthermore, in histochemical procedures where serial or semi-serial sections are often utilized in large numbers, the simplicity of preparation and the comfort of the operator must be considered . . . (From 16-page "Handbook on the Microtome-Cryostat" by John R. Baker, F.R.M.S., Director of Histology and Histochemistry, BioResearch Consultants, Inc., published unedited by International Equipment Co., 1284 Soldiers Field Rd., Boston, Mass.)

FOR THIS LITERATURE CIRCLE 82 ON READER-SERVICE CARD

## Waveform Synthesizer Speeds Electrophysiological Studies

GEORGE I. JOHNSTON, University of Oregon Medical School



A replica of desired physiological signals, correct in both amplitude and time, often is needed in electrophysiological study of nerve or muscle potentials and in the design of instruments used in such studies. A synthesizer has been recently used for this purpose by the Research Instrument Service at the University of Oregon Medical School.

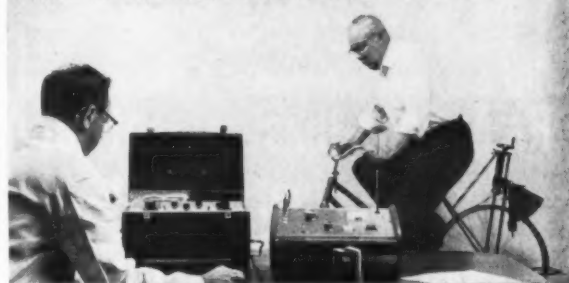
Until recently, there were but two choices in obtaining such signals. These were taped signals and direct "live" information. Both have disadvantages. A tape recorder, properly designed for recording electrophysiological information, is expensive and moderately limited in adaptability to other uses. Live information is even more difficult to obtain in the laboratory.

Now a third alternative is available which overcomes the disadvantages of tape and live methods. It is electronic synthesis of the desired waveforms. The instrument which accomplishes this is the Exact Waveform Synthesizer (developed and manufactured by Exact Electronics, Inc., Hillsboro, Oregon).

The problem confronting the university's instrument department was one of testing the breadboarded design of a fetal electrocardiogram counter. The counter, through electrodes placed on the abdomen of a pregnant subject, sorts out those impulses corresponding to the fetal heartbeat and presents them on a meter as a rate in beats per minute. Needless to say, attaching electrodes and tinkering with wires and transistors was disconcerting to a subject in advanced pregnancy. However, this was standard procedure in early design stages.

Later, with admitted skepticism, an Exact Waveform Synthesizer was rented and "tested" as a signal

#### RKG<sup>100</sup> radio-electrocardiograph EKG During Exercise — Now A Practical Procedure



The electrocardiogram during exercise has now become a practical procedure for office, hospital or research laboratory with the development of RKG 100, the radio-electrocardiograph. The RKG 100 is a miniaturized radio broadcasting system which relays electrocardiographic waves from subject to recording equipment. It eliminates all connective cables between patient and apparatus and permits unrestricted recording of EKG's while exercising or undergoing the physical and emotional stress of everyday activity. The system operates on an authorized radio frequency allocated by the Federal Communications Commission. It has been used successfully with more than 1,200 patients performing mild (Master Two-Step Test) or strenuous (stationary bicycle) exercise.

EKG During Exercise • Continuous Monitoring for Hospital or Research

WRITE: **TELEMEDICS INC.**

SOUTHAMPTON 2, PENNSYLVANIA

A Subsidiary of Vector Manufacturing Company, Inc.

CIRCLE 5 ON READER-SERVICE CARD

source for this application. It proved to be a completely satisfactory substitute for live signals and, because it was programmable, gave a range of typical signals which would have required many months to obtain from human subjects.

Using the Exact Synthesizer, the department constructed a typical waveform consisting of one fetal and one maternal pulse. Time adjustments permitted establishing a repetition rate of 100 beats per minute or infinite variation through the full range of interest. The Synthesizer also permitted change of pulse shapes over any desired range, change of amplitude ratio between fetal and maternal pulse, injection of "noise" into the signal, and change of either rate to the desired number of beats per minute. The Synthesizer helped distill into three weeks of testing what otherwise would have taken many months of setting up on scores of subjects.

At present, the university's instrument department is contemplating use of the Synthesizer in design of an electroencephalogram analyzer. Other applications are study and analysis of muscle and nerve action potentials—both easily synthesized by the instrument. Another of the school's departments is planning to use the Synthesizer in conjunction with an analog computer and still another department, as a complex pulse generator for nerve stimulation. In this latter application, trains of pulses can be readily programmed and a particular pattern instantly selected to stimulate nervous tissue. It is apparent that the Exact Synthesizer lends itself to numerous applications in medical research.

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### NEWS

## Biomedical Engineering at Northwestern University

EVANSTON, ILL.—Northwestern University's programs in biomedical engineering are directed by the Departments of Electrical Engineering and Physiology. The undergraduate program allows the electrical engineering student to select up to 8 courses in chemistry, biology, and physiology, and still take essentially all the required courses in electrical engineering. A senior course, "Scientific Measurements," is given to acquaint the student with measurement techniques. Another course, "Introduction to Biomedical Engineering," examines static and dynamic properties of nerve and muscle, synaptic transmission, sensory transducers, receptor organs, muscle characteristics, etc.

At the graduate level there are two possibilities, one leading to advanced degrees in the Department of Electrical Engineering, and the other in the Department of Physiology. An engineer and a life scientist work together as a team. Engineering students are now engaged in research studies with medical scientists from departments of surgery, internal medicine, pediatrics, ophthalmology, physiology, and biology. Scholarships, research assistantships, and fellowships are available through the Department of Electrical Engineering, (Professor Richard W. Jones) Northwestern Technological Institute, Evanston, Ill.

## Biomedical Engineering at Rochester

ROCHESTER, N.Y.—A biomedical program of research and graduate training was recently established at the University of Rochester under a five-year National Institutes of Health grant totaling \$254,407.

The course will be conducted by Dr. Daniel W. Healy, chairman of the Department of Electrical Engineering, and by Dr. Lee B. Lusted, professor of biomedical engineering and associate professor of radiology at the University of Rochester Medical Center. Invited lecturers of national stature will also take part, including those from Johns Hopkins University and the University of Pennsylvania, both of which also have received National Institutes of Health grants for biomedical engineering as part of a regional project in cooperation with the University of Rochester.

The program of graduate studies will lead to the Ph.D degree in engineering with special application to the fields of medicine and the life sciences.

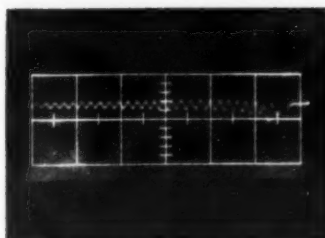
## Symposium On Recent Developments in Research Methods and Instrumentation

BETHESDA, MD.—The Eleventh Annual Research Equipment Exhibit and Instrument Symposium was held October 10-13, 1961 at the National Institutes of Health, Bethesda, Md. With 155 exhibits and 24 technical papers, this rapidly growing field of biomedical electronics and research apparatus was vividly outlined. The exhibits covered a wide range of electronics apparatus, with emphasis on analytical instruments (including pH), temperature measurements, cardiographic instrumentation, and data recording.

# Oscilloscope-Camera Recorders

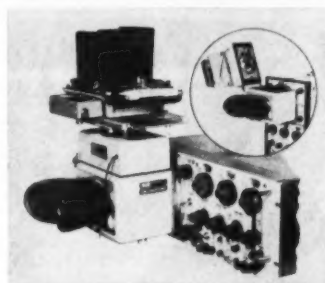


RESEARCHER in the process of photographing vectorcardiograph loops from the face of a cathode ray oscilloscope. (Photo courtesy Ampex)

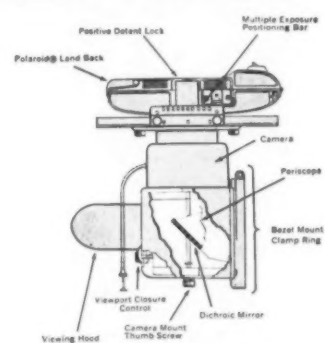


TRACE RECORDINGS photographed at f/1.9 on a P11 phosphor, on a 1,000 Mcs Tektronix Model 519 scope. Camera shutter was held open to await the random transient, and the graticule lines were double-exposed in afterwards to make them appear extra bright. Single transient was recorded on one frame of 10,000-speed PolaScope film, the sweep rate was 5 nanosec/cm. (Photo courtesy Tektronix Inc.)

### ANALAB INSTRUMENT CORP.



Analab Type 3000 series of oscilloscope cameras offers building-block design that permits the user to start with a basic camera and later alter its characteristics. Standard Analab cameras fit 5" oscilloscopes; an adaptor permits use on 3" scopes.



All Analab cameras feature periscope-binocular viewing of the screen, without parallax, while the recording is being made. A slip-hinge arrangement on the film holder/lens and shutter assembly allows easy access to the exposure setting. Electric shutter actuator is optional. The entire sub-assembly may be removed from the viewing/recording periscope. For f/1.9 lenses, a Type 3683 Lensette may be added to adapt the camera for close-up shots of instrument panels, schematics, data, etc. A variety of camera systems offers a choice of Polaroid roll or cut film holders, or any of a complete series of Graflex holders to accommodate conventional

Use of the cathode-ray-tube and camera recorders combination is the most popular technique for recording signals above 5000 cps; it is useful to frequencies above 1000 megacycles. Available equipment includes units for single-frame exposure, continuous-film motion, or cine-film motion. Accessories include special lenses and high-speed film (some with exposure index of 10,000).

The "maximum writing speed or rate" is a term related to both film sensitivity and camera efficiency. This term (when applied to cameras) depends on the film ASA rating, the tube phosphor, the accelerating potential and trace intensity, and the lens of the camera. Most oscilloscope cathode ray tubes use P11 phosphor because of its slow decay, long persistence characteristic.

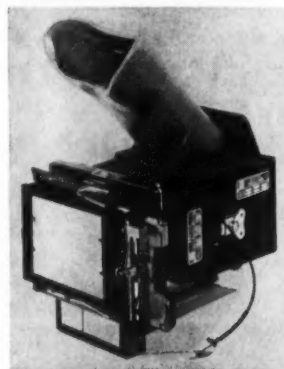
Object-image ratios vary with oscilloscope camera recorders. Some enlarge, some reduce the scope display; many give same-size pictures. A 1:1 ratio provides a photo print to the same scale as the scope display, and the dimensional significance of the scope trace is retained exactly on the print. With a 1:1 ratio recorder, for instance, if 1" represents 1 volt on the scope face, 1" will represent 1 volt on the photo print.

The following equipments illustrate the state of the art for available commercial apparatus:

film for high speed scope photography. Maximum writing speed exceeds 3500 cm/microsecond on 3,000 ASA film. All 4" x 5" cut film holders may be used with optionally available data chamber, which permits recording identifying information on the film record.—Analab Instrument Corp., 30 Canfield Rd., Essex County, Cedar Grove, N. J.

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### BEATTIE-COLEMAN



The Beattie line comprises a periscope unit with various camera attachments; also special "Radar-scopes," a camera for reading the output of an IBM 704, and a "Fluorotron" for mass X-ray tests.

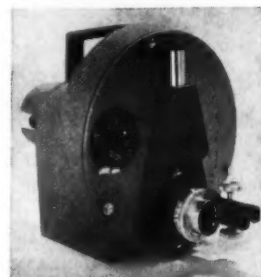
The Beattie Oscillotron Model K-5 recorder provides a group of interchangeable components for recording with single-frame, continuous-motion, and Polaroid-Land cameras. The following cameras can be mounted on the periscope assembly: (1) Beattie 10-second camera with a Polaroid-Land camera back. Up to 13 traces can be recorded on a single frame, up to 104 traces on a single roll. (2) 35-mm Oscillotron camera, comprising a modified Beattie Varitron and featuring an automatic electric 35-mm magazine that accepts up to 100' of film. (3) A continuous-motion film magazine that records variable-intensity or vertically-variable-position CRT spots. The KD-5 Oscillotron system permits simultaneous recording of CRT phenomena and appropriate identifying data. With film speed of 3,000, traces with speeds over 3500 cm/microsecond can be recorded.

Beattie has a new direct-view Oscillotron that permits the user to view the cathode-ray tube in a direct line of sight while recording. Data recording on each frame as well as a new 4" x 5" film adapter are optional.—Beattie-Coleman, 1000 N. Olive St., Anaheim, Calif.

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### BECKMAN & WHITLEY, INC.

Beckman & Whitley's new Model 364 Random-Event Oscilloscope Camera, special high-speed drum-type camera, is modification of Dynafax photo recorder. It provides total writing time of 6.99 msec on 35mm film at top drum speed of 8600 rpm,

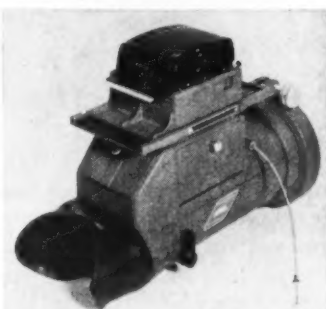


which gives film velocity of 400 ft/sec. Model 364 covers image-ratio ranges from 2:1 to 10:1. Lens focusing range is from 10" to 3', accomplished by a reflex-viewing eye piece (shown). Instrument mounts on Model 335 photographic stand. Operating speed is controlled by built-in variable transformer.—Beckman & Whitley, Inc., 985 San Carlos Ave., San Carlos, Calif.

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### DUMONT

DuMont Oscilloscope Recording Cameras include single-frame, continuous motion or automatic frame-advance units, on (1) standard film emulsions, (2) roll, cut or strip film, or (3) transparent or opaque Polaroid film up to 4" x 5".



The Type 299 has a Graflex camera with a variety of backs available for use with many styles of conventional film, 120 roll or cut. It is useful in general-purpose recording from 5" oscilloscopes. Type 302 has a Polaroid camera back and is interchangeable with Type 299. In both, a data card provides picture identification. A dichroic beamsplitter permits viewing of waveform, while recording, without danger of fogging film; and multiple, separate exposures per frame are possible.



The Type 321-A camera provides



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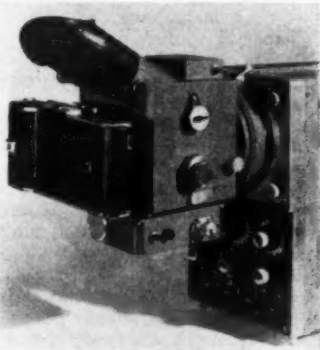




OSCILLOSCOPE CAMERA RECORDERS *Continued*

for recording any 5" oscilloscope display, either through continuous moving-film or single-frame exposures. Facilities for remote control are provided. The film transport system holds up to 400' of film and provides 16 selectable film speeds ranging from 0.8 to 3600"/min for full-length recordings. Two additional speeds of 5400" and 10,800"/min are available for short-length recordings. Timing markers are developed by a flashing argon glow lamp behind a small aperture in contact with the film.

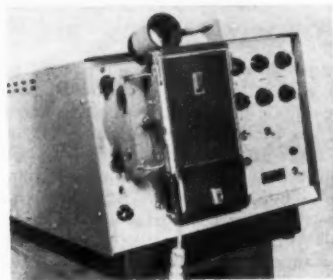
The Type 353 Polaroid 1:1 camera produces image-sized (3 1/4" x 4 1/4"), non-reversed records of traces from any standard 5" oscilloscope. A sliding detent back and rotatable barrel also permit multiple exposures per frame on either the long or short film dimension. Monocular viewing permits direct viewing of the trace during recording without danger of fogging the film under normal lighting conditions.



The Type 450 features interchangeable lenses and backs, permitting records in any sizes (4" x 5" to 35 mm) in image ratios of 1:1, 2:1 and 0.5:1 on regular or Polaroid film. All shutters are synchro shutters with external electrical connectors for arming oscilloscopes with a remote single sweep feature.—Allen B. DuMont Laboratories, Divs. Fairchild Camera and Instrument Corp., 750 Bloomfield Ave., Clifton, N. J.

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## EDGERTON, GERMESHAUSEN &amp; GRIER, INC.



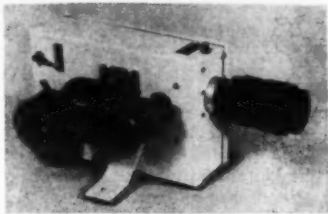
EG&G Model 850 Recording Camera, consisting of an oscilloscope camera, lens, and film holders, fits EG&G Model 707, Type 2236 and Type 2236A oscilloscopes. Its highly corrected f/0.7 lens permits photographic recording of the fastest single transient at a magnification ratio of 1:1. With film speed of ASA 400, traces with speeds up to 10<sup>12</sup> trace widths per second (trace width = 0.002") can be recorded. With Polaroid film 1 sec is usually sufficient for the counter exposure; about 5 sec is sufficient with Polaroid 400 film. Features include: precision fixed focus to prevent operator error, data card and film numbering system, manual or remote shutter control, and removable attached viewer with 5X magnification for direct observation of CRT display.

Film holders available for either cut film (PH-3) or standard Polaroid Land film (PH-5).—Edgerton, GERMESHAUSEN & Grier, Inc., 160 Brookline Ave., Boston 15, Mass.

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## ELECTRO-MEDICAL LABORATORY, INC.

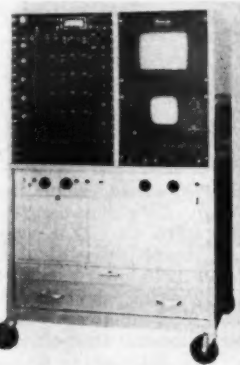
The Electro-Medical oscilloscope camera uses standard 100' reels of 35-mm film. There is a simple manual shutter, no iris, and an f/2.1 coated lens which can be focused to get full film coverage from CR tubes 2" to 21" in diameter. Film speed in the standard model is adjustable from about 1" to 10"/sec; film motion is continuous. No hood is required for



recording in subdued daylight or incandescent light with plain (not panchromatic) film and P11 phosphor tube. Traces with speeds to 10,000 ips and 10-ke traces can be recorded.—Electro-Medical Laboratory, Inc., South Woodstock, Vt.

CIRCLE 91 ON READER-SERVICE CARD

## ELECTRONICS FOR MEDICINE, INC.



Research Recorders manufactured by Electronics for Medicine feature cathode ray tube and optical system combined with a photosensitive strip chart. The beams of the tube in the camera do not sweep but move vertically while the paper moves at speeds of 1 to 200 mm/second.

The lens in the optical system is always open and the system is adjusted so that the image on the paper coincides in vertical amplitude and position with the traces being observed on a monitor. The cathode ray tube in the camera is a slave of a monitor tube which displays as many as eight traces simultaneously by means of a high speed electronic switch. Rise times as fast as 40 microseconds for full-scale deflection (18 cm) can be recorded; the only limitations other than those built into the amplifiers derive from the electronic switching rate.—Electronics for Medicine, Inc., 30 Virginia Rd., White Plains, N. Y.

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## ELECTRONIC TUBE CORP.



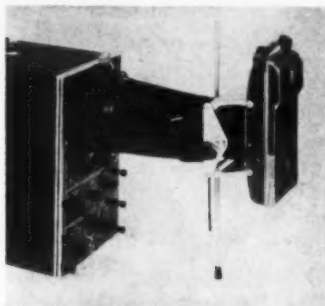
The ETC SM-100 camera is designed to fit all standard 5" scopes. It records on either 35-mm film or paper (perforated or unperforated) at a rate of from 1/2" to 12,000"/min. Film capacity is 400' or 1000'. A binocular viewer allows continuous viewing in subdued light during recording. The camera mounts in either a horizontal or vertical position and can be used with sloping-face console-type scopes. Object-to-image ratio is 4.5:1; timing marks are provided; and data card can be illuminated.

ETC Model SM-200 features a monocular viewer, Polaroid-Land camera back, f/1.0 Wollensak lens and Alphax shutter in a special mounting for fast single-frame prints and slides. Object to image ratio is 1:1.

ETC Model SM-209 has a detented, sliding back that allows 1 to 9 trace exposures on a single Polaroid print. The camera can be adjusted without being removed from the scope, rotates 360°, and is equipped with a monocular viewer. Object to image ratio is 1:0.9.—Electronic Tube Corp., 1200 E. Mermaid Lane, Philadelphia 18, Pa.

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## FAIRCHILD CAMERA &amp; INSTRUMENT

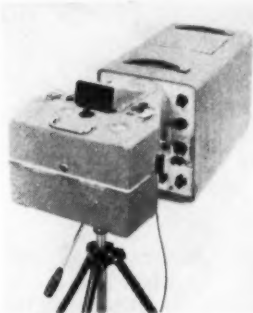


The Fairchild-Polaroid oscilloscope camera Model F-286 provides two exposures on each print through a 2-position quick-shift mechanism. Also, by shifting traces on the CR tube, multiple exposures can be placed on each half of the film. Image size is one-half of scope image. Model F-296 has same lens and shutter as Model F-286 but provides 0.92:1 image ratio (single image on each frame).

With the latest Polaroid film (3,000 ASA), traces with speeds up to 3500 cm/microsecond (1379"/microsecond) can be recorded by either model. Also, traces with speed up to 8500 cm/microsecond can be recorded by pre-fogging the film.—Fairchild Camera and Instrument Corp., Industrial Products Div., 580 Midland Ave., Yonkers, N. Y.

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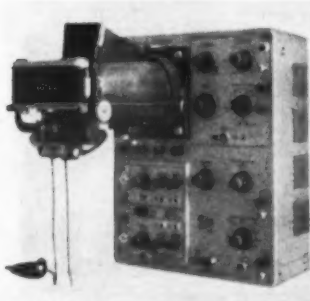
## HATHAWAY INSTRUMENTS, INC.



Hathaway Instruments Type C-6 portable unit adapts to 5" scopes, horizontally or vertically. It features continuous or single-frame 1:1 recording on 6" wide photosensitive paper or film from 1.5" to 250"/sec by using two sets of interchangeable gears. Typical writing rates are up to 1.5"/microsecond on Linagraph Pan Film with a P11 tube. A red-filtered aperture on top of the camera permits viewing during recording.—Hathaway Denver, Div. Hathaway Instruments, Inc., 1315 S. Clarkson St., Denver 10, Colo.

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## HEITZ



Heitz offers three automatic oscilloscope 35mm camera recorders—the regular ROBOT Recorder 24; the Recorder 24-e, which gives a second 8 x 8 image into the corner of the 24 x 24 frame; and the Recorder-f strip camera for continuous film advance. They interchangeably attach to oscilloscopes with up to 5" diameter by a swivel-mounted photo tube, which eliminates refocusing and resetting when the camera is reloaded. All three cameras can be equipped with 30' or 200' film magazines. A viewing release trips the camera shutter by impulse or by providing for automatic release from one picture every 1/4 second up to one every 24 hours.—Karl Heitz, Inc., 480 Lexington Ave., New York 17, N. Y.

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## TELELECTRODE \* A Significant NEW Advance in Electrode Design

The newly developed Teleelectro solves many of the problems of conventional electrodes. The Teleelectro is a patch type adhesive bandage with a metallic screen, paste reservoir, and contact snap fastener. Lightweight and disposable, each measures only 1 1/2 inches square. The Teleelectro is easily applied, complies with the surface motion of the skin and can be worn comfortably by the subject during extended testing. Used in more than 1,200 cases, the Teleelectro shows very low skin resistance and the EKG's are of uniform high quality.

The Teleelectro connects by its snap fastener to a six-foot, twin lead patient cable which is easily adaptable to any standard recording apparatus or other instrumentation.

A Teleelectro Kit is now available consisting of 50 Teleelectrodes, one twin lead patient cable with mating connector, a sample quantity of Teleelectro Paste, and six applicators.

\*Registered trademark, patent pending

TELELECTRODE KIT—\$20.00 plus postage

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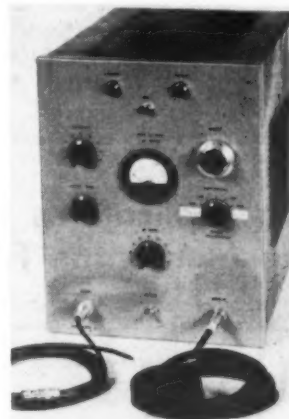
## Heart-Lung Apparatus

Heart-Lung Apparatus features: Dual DeBakey vertically flush mounted pumps built into stainless steel low cabinet . . . Interchangeable Variac silent vernier speed changes with additional emergency control, panel to accept tele-thermometer, water mixing valve, thermometer for water temperature, etc. . . . Oxygenator, disc type, 21" with deep mirror-finished end plates, with outlet and inlet an integral part of the bottom of the end plates, heliarc welded for smoothness and efficiency of blood flow . . . Conversion spacer to convert #2021 oxygenator (21") to 12" oxygenator . . . Disc drive complete built in with motor, variac control and flexible shaft . . . Filter and bubble trap—Gross design with built in sheath for extra sensitive probe making possible final temperature calibration of blood on arterial side . . . (From new bulletin, International Medical Instrument Co., 36 Montvale Ave., Stoneham, Mass.)

FOR THIS LITERATURE CIRCLE 97 ON READER-SERVICE CARD

## Spot Welder for Retinal Reattachment

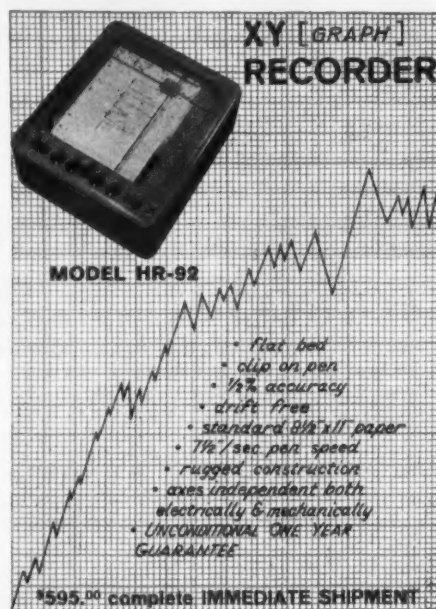
An instrument for retinal reattachment has been developed at the University of Oregon Medical School. It has been used in the laboratory on animal eyes for several years, and recently has been tested on human eyes which were to be removed because of other diseases. By



using a frequency of 27.12 Mc and a fine needle-like electrode and feedback voltage control, bursts of r-f energy are applied to the selected site of application (choroid). The electrode and frequency produce a small hole in the wall of the eye, as well as localization of the burn area in the choroid. Thus, burns can be made with less tissue destruction. Accurate electronic timing of r-f energy delivery eliminates errors that would otherwise be caused by variations in the thickness of the sclera and/or by human error in time of application of the electrode . . . [From article by OTIS RICH, JR. (Tektronix, Inc., Beaverton, Ore.) and R. V. HILL, M.D. (Medical School, University of Oregon, Portland)]

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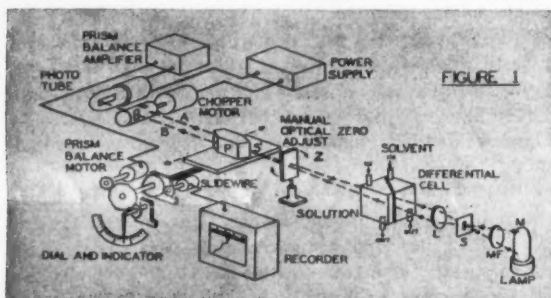
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## BRIEFS

### Differential Refractometer

The Differential Refractometer is a valuable tool for quantitative analysis of materials such as: alkaloids, steroids, antibiotics, hydrocarbons, rare earths, and other materials in binary solutions or in mixtures of near-



ly constant composition . . . Phoenix Refractometers will operate at maximum precision and accuracy as long as 0.5 percent of the incident light is transmitted by the sample in the differential refractometer cell . . . Light from the source labeled M is rendered monochromatic . . . Each beam is alternately interrupted by a synchronous chopper, and enters a diffuser system where the average light intensity of each beam is monitored by a photomultiplier tube. Any change in the refractive index of the flowing solution will cause a displacement of the slit image S' and a corresponding change in the intensities of the emergent beams A and B, resulting in an unbalance signal. This signal . . . is transmitted to the servo system, which determines direction of balance. The lateral position of the prism table is a linear measure of the refractive index difference between the solvent and solution . . . (From 8-page Bulletin R1000, Phoenix Precision Instrument Co., 3803-05 N. Fifth St., Phila. 40, Pa.)

FOR THIS LITERATURE CIRCLE 99 ON READER-SERVICE CARD

### Typical Applications for Polypore Membrane Filter

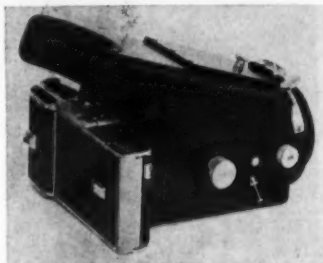
Type	Pore Size	Application
AM-1	5.0	Cytology; cancer detection; filtration in ultrasonic cleaning loops.
AM-3	2.0	Aircraft fluid filtration; sampling nuclear debris; filtration of instrument air supplies.
AM-4	0.80	Air pollution studies; contamination control of fuels; study of spores and fungi.
AM-5	0.65	Radioactivity air studies; beverage clarification; dairy microbiology.
AM-6	0.45	Contamination analysis of hydraulic fluids; Coliform detection in water.
AM-7	0.30	Sterilization of gases and air; sterile filtration; drug and serum sterilization; production of super pure water; recovery of valuable solvents and filtrates.
AM-8	0.20	Sterility testing.
AM-9	0.10	Filtration of fine colloidal particles.
AM-10	0.05	Virus research.

. . . (From 24-page brochure, Gelman Instrument Co., 106 N. Main St., Chelsea, Mich.)

FOR THIS LITERATURE CIRCLE 100 ON READER-SERVICE CARD

## OSCILLOSCOPE CAMERA RECORDERS *Continued*

### HEWLETT-PACKARD

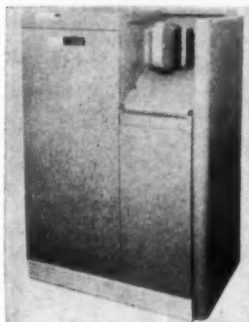


The Hewlett-Packard Model 196A oscilloscope camera has an object-to-image ratio of 1 to 0.9 to show full 10-cm graticule width. Image is viewed with both eyes. Lens adjustments are made through an access port while the camera is in position. A standard camera bellows simplifies multiple-exposure procedures. A knob moves the lens through 11 detented vertical positions while the camera back remains fixed. A quick-connect clamp provides support. Uses a Wollensak 75-mm f/1.9 lens with additional field correction and edge resolution.

A Model 166C Display Scanner plus a 160B or 170A oscilloscope and X-Y recorder permits large-scale X-Y recordings of the displayed waveform.—Hewlett-Packard Co., 1501 Page Mill Rd., Palo Alto, Calif.

CIRCLE 101 ON READER-SERVICE CARD

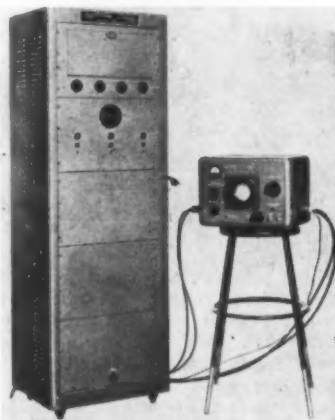
### INTERNATIONAL BUSINESS MACHINES



IBM's 740 CRT recorder is used with the 704 and 709 data processing system. The 740 contains a 7" cathode-ray-tube characterized by a raster consisting of 1,024 positions for the ordinate (Y) deflection and 1,024 positions for the abscissa (X) deflection. The tube has a persistence of several microseconds and has unusually precise deflection characteristics. Its position stability is better than 0.1% and a minimum error of 0.5% positional accuracy can be expected. A camera using commercially available 35mm film is standard equipment. The camera is equipped with a removable film magazine having a capacity of 100'. Film frame change is under calculator control and requires less than 50 microseconds to initiate.—International Business Machines, Inc., Data Processing Div., White Plains, N. Y.

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### LIBRASCOPE



Librascope's custom-made Model C Image Converter Camera photographs transient phenomena in the millimicrosecond region. The camera, designed around an image converter tube, is electrostatically focused and deflected. Exposure times to 10 millimicroseconds are possible.

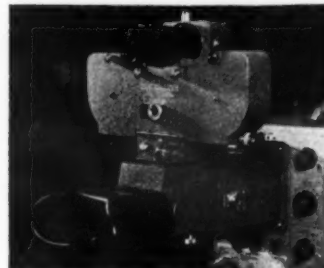
The event can trigger the camera within millimicroseconds. Exposure time is adjustable. Each frame is independently controlled and continuously variable. Exposure time is

0.05 to 1.0 microsecond; frame spacing is 0.5 to 50 microseconds; number of frames can be 1 to 5 as selected.

Display also can be recorded by Polaroid camera mounted on special housing using fast Polaroid film. The image-converter tube holds the signal long enough to reproduce the signal on the Polaroid film. The units are built to customer order.—Librascope Div., General Precision Inc., Glendale 1, Calif.

CIRCLE 103 ON READER-SERVICE CARD

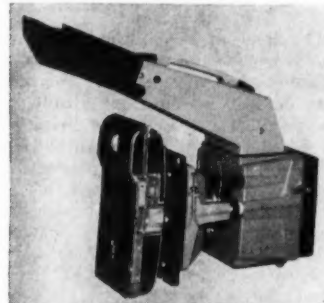
### PHOTOGRAPHIC INSTRUMENTATION DEVELOPMENT CO.



PID OC-1 series, 35mm and 70mm, oscilloscope strip film cameras rotate 90° to record on either axis. They "streak record" the data cycle at speeds to 1000 ips. A beam splitter permits viewing during recording; parallax is eliminated. The cameras feature automatic shut-off and 51mm f/1.5, 7-element Raptar lens.—Photographic Instrumentation Development Co., 19458 Ventura Blvd., Tarzana, Calif.

CIRCLE 104 ON READER-SERVICE CARD

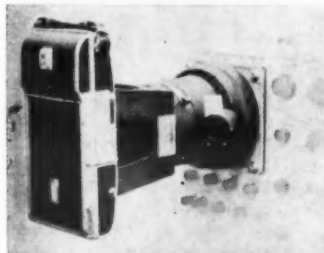
### TEKTRONIX



Tektronix C-12 Camera provides undistorted, direct recording of oscilloscope traces. Sliding back is horizontal or vertical; 6 interchangeable lenses have varying object-to-image ratios and maximum aperture to f/1.5. It features one-hand portability, lift-on mounting, swing-away hinging, comfortable viewing with or without glasses.—Tektronix, Inc., Box 500, Beaverton, Ore.

CIRCLE 105 ON READER-SERVICE CARD

### TELECHROME MANUFACTURING CORP.



Telechrome's Model 1521-A Oscilloscope mounts by means of a light-tight hood to the bezel of any 5" scope. A viewing port on the side of the hood permits observation of traces to be photographed. The camera uses Polaroid film, 75mm f/1.9 Wollensak lens; shutter speeds range from 1 to 0.01 second; image ratio is 1:1.

The camera records traces of single transients up to 1"/microsecond. Focus is fixed at 9" with an allowance for critical adjustments provided by a 1/2" movement in the focusing sleeve.—Telechrome Manufacturing Corp., 28 Ranick Dr., Amityville, N. Y.

CIRCLE 106 ON READER-SERVICE CARD

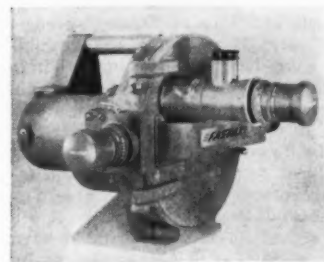
### VOUGHT

Vought is developing a 1000', 35mm computer-operated camera for cathode-ray-tube data recording. In addition, Vought offers a large line of photographic data recording devices

for all film sizes with frame rates from pulse operation (time-lapse) to over 1000 frames per second.—Vought Camera Co., 8907 Melrose Ave., Los Angeles 46, Calif.

CIRCLE 107 ON READER-SERVICE CARD

### WOLLENSAK



Wollensak's line of 30 Fastax cameras includes continuous-motion oscilloscope streak recorders, full-frame and split-frame cameras for various film sizes and speeds, and combined motionpicture oscillograph cameras.

Twelve models have 100' to 400' film capacity and record streak images from 4' to 200'/sec. The new WF30 and WF32 have a film capacity of 1200'.

Models WF14, WF15, WF17, and WF21 are combination motionpicture and oscillographic-streak cameras. They have two lenses, permitting oscilloscope traces and motion pictures of the patient to be recorded simultaneously on the same frame.

Models WF2S, 14S, 14ST, 15S, 22S feature rapid stop-start that allow multiple runs throughout the 400' roll.—Wollensak Optical Co., 850 Hudson Ave., Rochester 21, N. Y.

CIRCLE 108 ON READER-SERVICE CARD

## ACCESSORIES

### POLAROID FAST FILM

Polaroid Corporation's PolaScope Type 410 Land film has a speed rating of 10,000 ASA. It is specifically designed for recording low-light-level sources—oscilloscope traces, photomicrographs, and for use with cathode ray equipment being used in medical research. Successful pictures have been made of scope pulses with rise times in the sub-nanosecond (billionth-of-a-second) range, almost invisible traces.

Increasing the maximum writing rate will often reveal invisible portions of a fast trace. There are three ways to increase the maximum writing rates of Polaroid films:

1. Decreasing the development time, which doubles writing rate and requires no extra effort, can be used at all times for shooting high speed transients.

2. Prefogging, or controlled marginal exposure of the film to a light source before exposure to the trace, will increase maximum writing rate two to three times.

3. Transillumination, viewing a print directly over a bright diffused light such as a 100-watt lamp, will render visible very dim or unreadable traces with surprising clarity.

PolaScope prints require 10 seconds for development (only two seconds need be inside the camera, eight seconds in day or room light), so that film may be advanced at 2-second intervals.

Type 47 film has a daylight exposure index of 3000. With prefogging techniques, writing rates can exceed 8000 cm/microsecond.—Polaroid Corp., Technical Sales Dept., 741 Main St., Cambridge 39, Mass.

CIRCLE 109 ON READER-SERVICE CARD

### WOLLENSAK OSCILLO RAPTOR LENS

The Wollensak Oscillo Raptor six-element anastigmat lens is designed especially for oscilloscope recording to provide a distortion-free, curvature-free anastigmat lens with fine resolution and sharp corner definition. The 3"-focus, f/1.9 lens is made in two types—one for 1:0.9 reduction and one for 1:0.5 reduction for 3" x 4" format. It generally is supplied in a #3 Alphax shutter, with optional synchronization.—Wollensak Optical Co., 850 Hudson Ave., Rochester 21, N. Y.

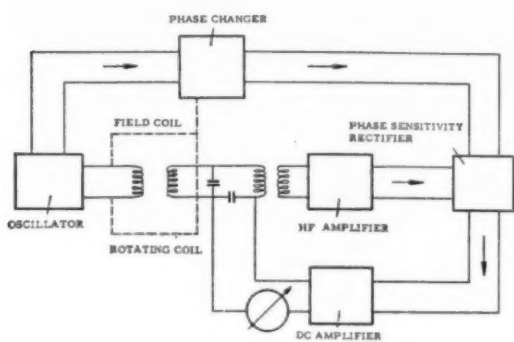
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## BRIEFS

## Vacuum Micro Balance

The Electra I is the ideal balance for the instant weighing of small objects to an accuracy of 1 microgram. It is used in biochemical, biological and microchemical work . . .



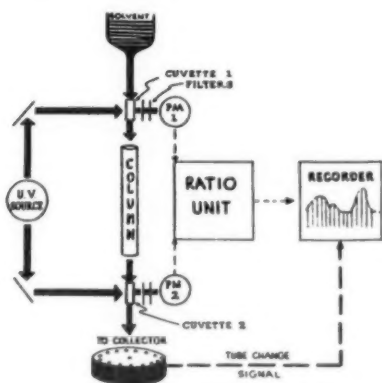
The vacuum Electra II is used more for recording of weight changes than for direct weighing. The hermetically sealed housing facilitates operation at low pressures or at defined partial pressures for certain materials in an inert gas atmosphere. It is thus possible to conduct evaporation tests and studies of the speed of oxidation . . . Results can be obtained without loss of accuracy on samples of 0.2 to 0.3 m<sup>2</sup>/g. Making such measurements by weighing adsorption layers is both faster and simpler, and evaluation is much less complicated than with gas volumetric methods . . .

The basic principle of the Electra I circuit: The field coil is energized by an oscillator. A high frequency signal in phase quadrature is fed to the HF amplifier from the rotating coil. This energy passes through a transformer whose primary winding serves as a divider. Coupled to the outlet side of the HF amplifier is a phase sensitive rectifier. This rectifier is controlled by the oscillator via a phase advancer. Then follows an RC shunt element and the DC end stage. The latter supplies a DC current which is dependent on the angle and speed of rotation. The DC current returns to the rotating coil via a measuring instrument . . . (From 10-page bulletin, Brinkmann Instruments, Inc., 115 Cutter Mill Rd., Great Neck, L. I., N. Y.)

FOR THIS LITERATURE CIRCLE 111 ON READER-SERVICE CARD

## Base Compensating U-V Flow Analyzers

Canalco's U-V Flow Analyzers are for automatic location and quantitative measurement of ultraviolet-absorbing materials in flow, with flat base line and full sensitivity maintained in the presence of UV-absorbing sol-



vents, and for use in column chromatography and other flow systems . . .

Although Canalco's eight models of flow analyzers differ in specific detail, the general system consists of a Double-Pass Monitor Head, a Ratio Recorder, and appropriate power supplies and control circuits. The Monitor Head houses a double photometric system. In the filter models, a central U.V. light source is flanked on either side by interference filters and fused quartz flow cuvettes, through which the U-V light is passed to the cathodes of two phototubes. In the "M-Series," the light beam passes through a monochromator and a beam splitter. Through one cuvette is passed an eluting solvent. Its absorption, as the concentration is increased, is monitored by the phototube on that side, and the resulting signal is fed into the Ratio Recorder as the reference. Through the other cuvette is fed the combined eluate from the column, and its absorption signal is fed from the second photocell to the Ratio Recorder . . . (From 6-page brochure, Canal Industrial Corp., 4935 Cordell Ave., Bethesda 14, Md.)

FOR THIS LITERATURE CIRCLE 112 ON READER-SERVICE CARD

## Left-to-Right Shunts

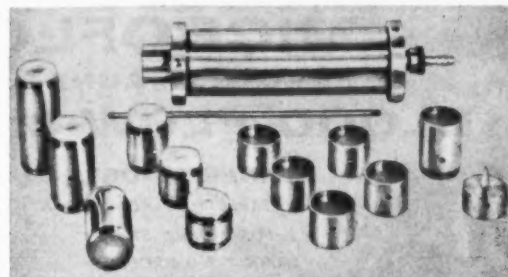
Detection of left-to-right shunts is an important aspect of the diagnosis of congenital heart disease. Present methods for detecting these shunts depend largely upon the analysis of blood samples, drawn from the right heart through a catheter, with subsequent gas analysis. It is the purpose of this report to describe a method for detecting left-to-right shunts which does not require drawing blood samples but which depends upon the use of the platinized electrode capable of sensing hydrogen-containing left-heart blood flowing into the right heart. The electrode, mounted at the tip of a cardiac catheter, develops a potential in the presence of blood which has been exposed to hydrogen in the lungs following the administration of a breath of hydrogen to the patient . . .

By suitable placement of hydrogen electrodes, the response which is, for practical purposes, instantaneous, it is possible to accurately time the inhalation of hydrogen and its subsequent appearance in any part of the circulatory system. Further, its rate of build-up in, and disappearance from, the blood can be simultaneously and continuously monitored from different points. A large potential (in the order of 100 mv) is developed by the electrode when used as described below . . . (From reprint of report by Leland C. Clark, Jr., Ph.D., and L. M. Barger, Jr., M.D., Dept. of Surgery, University of Alabama Medical College, Birmingham 5, Ala., compliments of American Electronic Laboratories, Inc., 121 N. 7 St., Phila. 6, Pa.)

FOR THIS LITERATURE CIRCLE 113 ON READER-SERVICE CARD

## Composite Column for Chromatography

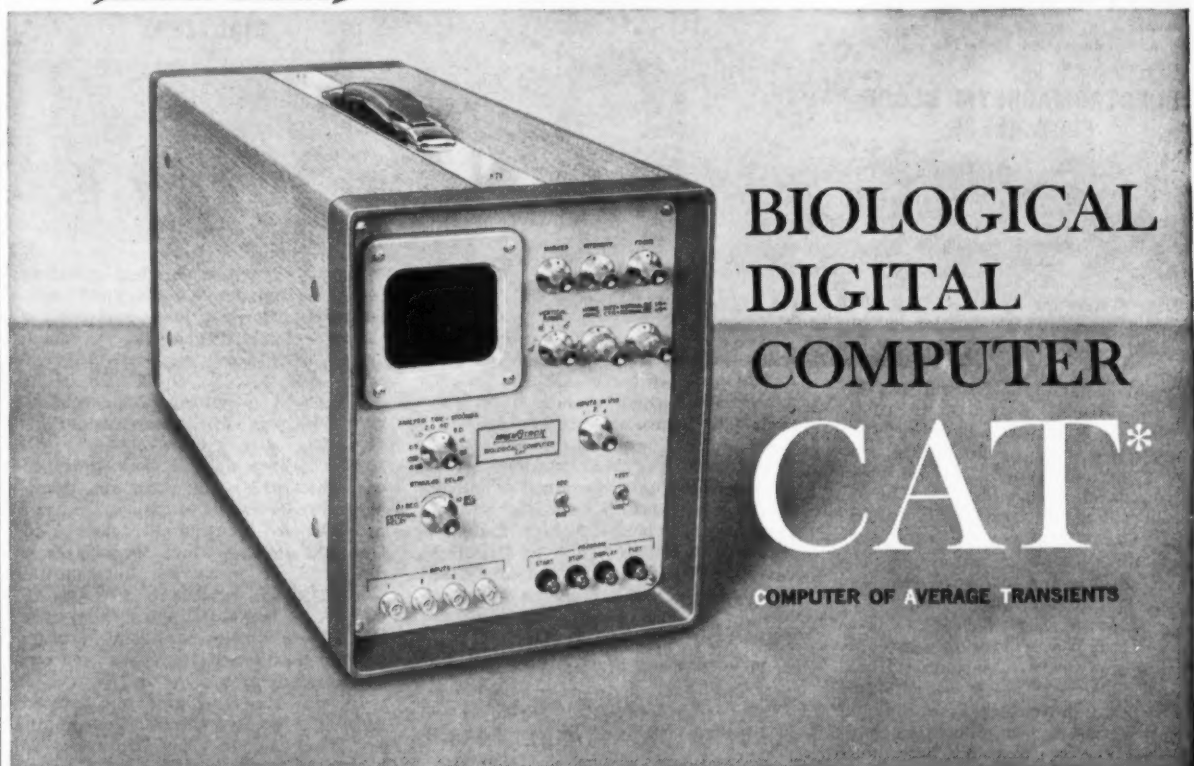
The LKB 3348 is . . . an unusually effective and versatile tool for analytical and preparative chromatography by elution, displacement and frontal analysis methods. Composite column construction provides high separating



capacity and produces high zone or front sharpness, especially with high concentrations. Column consists of a series of individual column units of successively decreasing length and diameter, interconnected by capillary couplings by means of which fronts are remixed and straightened. Any of the well-known adsorbents can be used, including ion exchange resins, alumina, activated carbon, etc. Column units are constructed of acid-proof steel with polyethylene linings . . . (From 6-page Supplement to General Catalog, Ivan Sorvall, Inc., Norwalk, Conn.)

FOR THIS LITERATURE CIRCLE 114 ON READER-SERVICE CARD

## FROM MNEMONTRON LEADERS IN BIOLOGICAL DATA PROCESSING



for simultaneous, on-line calculation of average evoked responses of several variables

The CAT Mnemontron BIOLOGICAL DIGITAL ON-LINE COMPUTER is a flexible small digital computer for the study of biological and other variables, where response information is to be extracted from noise.

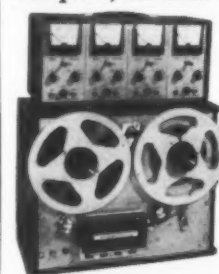
Biological responses to stimuli are generally masked by variability produced by other factors. The CAT digital computer is able to extract the precise response pattern from the "noise" even when that noise may be tens of times larger than the response itself.

The CAT computer calculates the average response to repeated events and can do this simultaneously for four different variables. It is thus ideal for the simultaneous observation of average evoked brain potentials from four different regions of the brain, also for averaging nerve potentials, retinograms, cardiographic data, phonocardiograms, autonomic functions, pupil responses and many other biologic variables, as well as seismographic data.

The averaging is carried out "on-line," that is to say, the computer calculates the data as they occur. At the end of an experimental run the average responses are already computed. The averages may be observed during any part of the experimental run on a visual oscilloscope display.

The average responses are calculated for 400 ordinates which may be spaced at intervals selected from a very wide range. The data may be scanned for the entire 400 ordinates in times ranging from 62.5 milliseconds to 64 seconds selectable by multiples of 2.

## Complete, ANALOG TAPE-RECORD/REPRODUCE\*



## 4 CHANNEL SYSTEM

## New MNEMONTRON Model M204

0.2% precision at a low price! Mnemontron offers a unique pulsed FM principle and fully transistorized, self-contained unit that records all analog data • data acquisition • storage, analysis and reduction • time scale contraction and expansion • programming • computer read IN and read OUT • dynamic simulation. With Mnemontron, you can do more with paper recorders . . . expanding frequency response and channel capacity, saving you from being deluged with data, permitting you to look at the same data at different time scales.

Complete with 10 1/2" tape transports, \$3,495.

(Systems available with up to 14 channel capacity.)

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Price: \$10,950.00 (rental plan available)

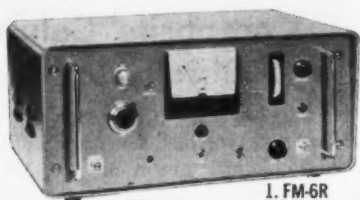
Complete specifications available upon request. Write for Descriptive Bulletin.

**MNEMONTRON**  
CORPORATION

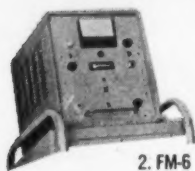
Precision Analog Data Tape Recorders and Biological Computers

55 South Main St., Pearl River, N. Y.  
PEARL River 5-4015 (914) • Cables: Mnemontron

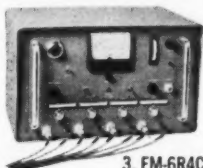




## MICROFLO<sup>TM</sup> ELECTROMAGNETIC BLOOD FLOW METER



- THREE MODELS**
1. TABLE TOP—RELAY RACK
  2. FOR MOBILE STAND
  3. FOUR FLO-PROBES—RAPID SWITCHING



MICROFLO provides accurate blood flow data for research or surgery. Now being used in the fields of transplants, vascular anomalies, surgical evaluation, extra corporeal system monitoring, secretory and excretory and pharmaceutical effect studies. Currently in use at Johns Hopkins, UCLA, CME, Baylor, U of Minnesota, Stanford, U.S. Navy and other leading hospitals and research institutions. If your work or studies require accurate blood flow measurements, write today for descriptives.

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## MICRO VAPOR PRESSURE APPARATUS

New MVP 1300, newest model micro-vapor-pressure apparatus, uses stainless steel cell to house vapor pressure chamber, and small stainless-

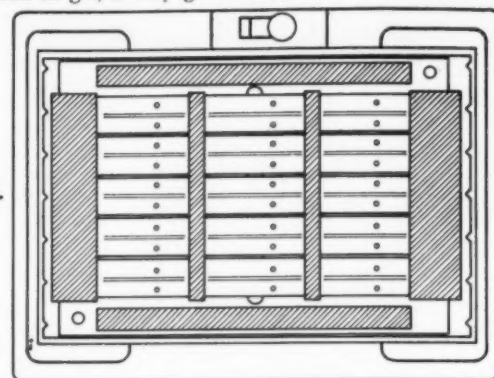


steel bomb that fills sample-holding chamber in cell to permit handling samples with high vapor pressures. 0.3-ml volume of sample stem gives 4:1 vapor/liquid ratio in 1.2-ml chamber, directly correlates with Reid apparatus. Almost any vapor/liquid ratio can be obtained simply by using stems of different sample volumes. High-speed pump-out of manometer system means that 12 samples can be determined per hour.—Fisher Scientific Co., 711 Forbes Ave., Pittsburgh 19, Pa.

CIRCLE 121 ON READER-SERVICE CARD

## Immuno-electrophoresis

With immuno-electrophoresis, which is a combination of agar-gel electrophoresis and an antigen-antibody reaction in gel, a very good resolution of the immunoelec-



Arrangement of microscope slides in the cassette during electrophoresis. Cross-hatched areas represent filter paper strips.

trophoresis pattern of human serum into about 30 electrophoretically and/or immunologically different protein components can be obtained. Certain of these components were found to exhibit electrophoretic variations in different sera, a phenomenon which makes possible a classification of human sera in 9 main types . . . In the present work the immuno-electrophoretic technique, which has been used for characterizing these group-specific systems, is discussed . . . (From 8-page reprint from *Science Tools*, Vol. 7, No. 2, 1960, LKB Instruments, 4840 Rugby Ave., Washington 14, D. C.)

FOR THIS LITERATURE CIRCLE 124 ON READER-SERVICE CARD

## Chemical Dosimeter

The chemical dosimeter (developed by Massachusetts General Hospital radiologist Dr. Majic S. Postsaid and his assistant, Dr. Goro Irie, and made available by the Fisher Chemical Manufacturing Division) provides quick, convenient determination of amount, field, and penetration of radiation on solid phantoms, before treating patients . . . The product consists of two components that are mixed together, as needed, to make solid phantoms of body parts and tissues. The resulting dosimeter has a density close to that of human skin, plus a yellow color that changes to red in proportion to the amount of ionizing radiation absorbed. Color change occurs as long as particle radiation is 1000 roentgens or more, a single exposure furnishing an immediate 3-dimensional color picture of the dose . . . (From new Bulletin TD160, Fisher Scientific Co., 711 Forbes Ave., Pittsburgh 19, Pa.)

FOR THIS LITERATURE CIRCLE 125 ON READER-SERVICE CARD

## Transistor Electroencephalograph

The Type TC electroencephalograph has many advantages of both clinical and experimental applications . . . The highly developed transistorized circuits of the Type TC have much higher reliability than is possible in any



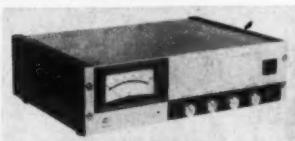
vacuum tube instrument . . . The Type TC is superior to any conventional EEG in every important respect: it has higher sensitivity, more faithful response to both low and high frequencies, superior linearity, freedom from baseline sway, a rejection ratio in excess of 10,000 independent of any balance requirement, with consequent high immunity to interference . . . The Type TC is immediately ready for use. It is not necessary for the technician to wait 30 to 60 minutes for the instrument to warm up and stabilize its operation. Economy of operation results from the lack of need for skilled maintenance personnel, frequent "down-time" for servicing, and the possible need for rerunning subjects as a result of instrument malfunction. Versatility of application results from the d-c amplifier construction of the Type TC, together with its exceptionally wide range of response. This makes the instrument available for many other types of recording, besides clinical EEG . . . (From 8-page Bulletin 7611, Offner Div., Beckman Instruments, Inc., 3965 River Rd., Schiller Park, Ill.)

FOR THIS LITERATURE CIRCLE 126 ON READER-SERVICE CARD

## New Products

For more information circle the number on the Inquiry Card.

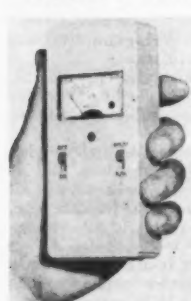
### ELECTROMAGNETIC BLOOD FLOWMETER



New Metreflow System-Series 5000 for measurement of blood flow within the intact blood vessel or through the heart pump circuit features a complete blood flow measuring system which includes an electromagnetic flowmeter, integrator computer (analog) and a digital counter. The system, though designed for connection to any standard recorder, may be operated independently. Flow rate and total volume flow are presented digitally. Phasic flow is presented on a meter. Probes for intracorporeal and extracorporeal use are offered in a wide range of sizes. A probe calibrator which is inexpensive and extremely simple to operate, permits calibration of the entire system and obviates the bleeding-down technique. Normal saline is used as the calibrating solution.—Avionics Research Products Corp., 4254 Glencoe Ave., Venice, Calif.

CIRCLE 115 ON READER-SERVICE CARD

### POCKET SURVEY METERS



Three new models of Pocket Radiation Meters for detection of radioactivity fit into vest or shirt pockets for instant use. They operate on ordinary penlight batteries or mercury cells from -20° to +140° F. Ranges: Civil Defense Model, 0.1 to 2 R/hr and 1 to 100 R/hr; Standard Model, 0.1 to 50 R/hr and 0.01 to 1 R/hr; High Range Model, 1 to 500 R/hr and 0.2 to 50 R/hr.—Gelman Instrument Co., Chelsea, Mich.

CIRCLE 116 ON READER-SERVICE CARD

### CARDIAC PROGRAMMER

New electronic Cardiac Programmer is activated by heart's R wave and is used to control exact time of action of any slave mechanism or circuit in synchronization with cardiac cycle. Output circuit can be caused to turn on and off automatically in any phase of each heart cycle, and for controlled but variable period of time.—Cordis Corp., 241 N. E. 36 St., Miami 37, Fla.

CIRCLE 117 ON READER-SERVICE CARD

### BIOLOGICAL REFRIGERATION RECORDER



New remote-reading Tempscribe records storage temperature of biological refrigerating unit. Temperature-sensitive bulb immersed in glycerin-filled container inside refrigerator transmits impulse through capillary tubing to the recorder. The Tempscribe chart provides a 7-day record, is spring-driven to eliminate the danger of power failure. Temperature range is -5° to +15°C, which covers every biological refrigeration need.—Bacharach Industrial Instrument Co., 200 N. Braddock Ave., Pittsburgh 8, Pa.

CIRCLE 118 ON READER-SERVICE CARD

### LABORATORY STIMULATORS

New Model 104-A Stimulator provides single shocks, pairs, trains of two or more, or continuous stimuli at frequencies from 1 every 10 sec to 10,000/sec with continuous control from 0.1, 1, 10, 100 cps and 1, 10 kc/s. Maximum power output is 25 watts at 250 volts, sufficient to allow use of accessories such as AEL Model 112 Isolation unit and Model 127 Photoc Stimulus accessory.—American Electronic Laboratories, Inc., Richardson Rd., Colmar, Pa.

CIRCLE 119 ON READER-SERVICE CARD

### ECG VIA PHONE

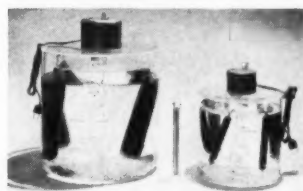
New Phonatrace transmits ECG's via regular telephone lines. Transmitter attaches to electrocardiograph machine and converts electrical im-



pulses of heart into audible FM signals. Receiver reconverts FM signals into electrical impulses, feeds them to ECG recorder. Several ECG tracings can be recorded on tape and transmitted at one time. System has been demonstrated in transmissions over more than 3,000 miles of telephone line, and over water by wireless telephone.—Bircher Corp., 4371 Valley Blvd., Los Angeles 32, Calif.

CIRCLE 120 ON READER-SERVICE CARD

### DIALYZERS



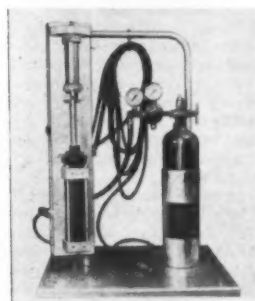
New large-volume, self-agitating Model C Dialyzer is particularly useful in equilibrating large samples for subsequent electrophoresis. As much as 3½ liters can be treated at one time against a buffer volume of as much as 11 liters for either equilibrium dialysis or concentration dialysis.

Also, a new special tank equipped with inlet and outlet ports for standard-size Model B Multiple Dialyzer provides for continuous renewal of the fluid against which the sample is dialyzed. As many as 16 separate samples, each consisting of up to 20 ml, can be treated simultaneously for either equilibrium or concentration dialysis against continuous in and out flow of buffer.

In both models, samples are rotated in dialyzing bath by 115-v gearmotor. Specimen carrier is adjustable in height, is supported by plastic structure within Pyrex tank. Agitation is accomplished as dialysis tubes containing samples pass over four vertical baffles.—Oxford Laboratories, 961 Woodside Rd., Redwood City, Calif.

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### DYE INJECTOR

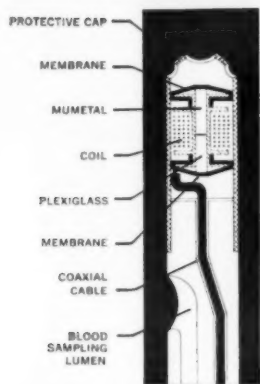


New Dye Injector, for use in coronary arteriography, permits 3 successive injections of contrast material without having to stop to refill syringe. Successive injections are possible when injector is used with Medtronic Electrocardiosync. Unfavorable reaction by patient to contrast material is instantly indicated by "R" Wave monitor light on Electrocardiosync. Injector is available with syringe sizes of 65, 105, and 135 cc under controlled pressures up to 700 psi.—Medtronic, Inc., 3055 Highway 8, Minneapolis 18, Minn.

CIRCLE 123 ON READER-SERVICE CARD



## Intracardiac Catheter



The Dallons-Telco MM41R Micromanometer features . . . Allard-Laurens intracardiac transducer and coaxial catheter for simultaneous recording of intracardiac sounds and pressures and provides blood sampling from a single catheter . . . The electromagnetic transducer consists of an induction coil with a movable core and is in effect a high speed transducer sensitive to liquid pressures and murmurs because of its accurate and remarkably high frequency response . . . A side lumen, size #6 for blood sampling is located 15 millimeters below the tip of the catheter. This side lumen can also be used to connect an external manometer, for the zero calibration of the intracardiac micromanometer or for blood sampling.

The variations of inductance are transmitted through a coaxial cable in a separate lumen which frequency modulates an oscillator. The sound components of the pressure curves, which are collected at the discriminator of the apparatus, show vibrations superimposed on the pressure signal. A high quality filter extracts all frequencies exceeding 40 cps and these then represent the "intracardiac sounds."

Thus intracardiac pressures and sounds are recorded simultaneously and instantaneously. The entire electromagnetic transducer is enclosed in a precision machined plexiglas housing which has no chemical action on heart tissues . . . (From series of data sheets and 8-page catalog, Dallons-Telco, Dallons Laboratories, Inc., 5066 Santa Monica Blvd., Los Angeles 29, Calif.)

FOR THIS LITERATURE CIRCLE 127 ON READER-SERVICE CARD

## Televised, Remote Controlled X-Ray

New X-ray equipment installed at the Fall River, Mass., Union Hospital comprises remote controlled television fluoroscopy, a 35mm motion picture camera, and a 70mm spot film camera. With microwave relays it is possible for the X-ray to be seen at any remote location.



Dr. Jack Spencer, the hospital's roentgenologist, says, "With the new equipment I have undivided attention to the patient." Instead of having the X-ray and fluoroscopic equipment moved around the patient as in the conventional setup, any part of the patient can be centered to the X-ray tube.

Exposure of the patient to radiation is reduced by 90%. "The radiologist gets 100% less," Dr. Spencer says. Use of a remote controlled palpating arm with five micro switches to control degree of compression eliminates wearing lead gloves. The radiologist sits behind a lead-walled barrier, which at Union Hospital includes a 24" x 48" lead-glassed window, and controls everything from there. A 9" image intensifier transmits its image through a television camera with a Vidicon tube to a TV monitor . . . (From press release, Medical Div., North American Philips Co., Inc., 525 W. 55 St., New York 19, N. Y.)

FOR THIS LITERATURE CIRCLE 128 ON READER-SERVICE CARD

## Circuit Monitoring

The Circuit Monitor is capable of measuring circuit fluctuations below the level that would be harmful to the best resolution of any electron microscope now in general use. Full scale on the high-sensitivity meter setting represents 1 millivolt peak-to-peak, with visual divisions down to 20 microvolts. Lens current variations are measured by monitoring the voltage across a .00002 precision resistor in series with the lens coil . . .

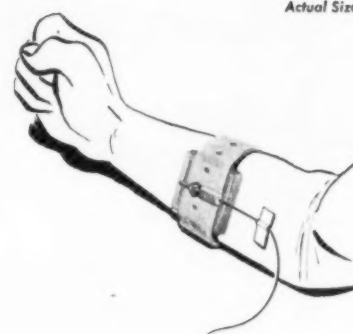
Electrical fluctuations can be caused by many things, primarily: Line surges which your microscope cannot handle; a burst of noise from any source; change in temperature of key components; weakened components, such as capacitors . . . (From 12-page brochure, Canalco (Canal Industrial Corp.), 4940-51 St. Elmo Ave., Bethesda 14, Md.)

FOR THIS LITERATURE CIRCLE 129 ON READER-SERVICE CARD

# TRANSDUCERS

Transducers represent what is probably the most important element in the patient-diagnostic machine relationship. Accuracies of judgments of the physiologic status are related directly to the fidelity, amplitude and reliability of signals produced by the transducer. Therefore it is imperative that the transducer be designed for a high signal-to-noise ratio. Artifact should be insignificant. Maintenance should be simple and rapid. Most important, the transducer should never produce disturbances in the organic system to which it is applied.

The transducers described below will meet the requirements of most clinical and research applications. We are also prepared to discuss transducers for special applications. Write us stating your requirements.



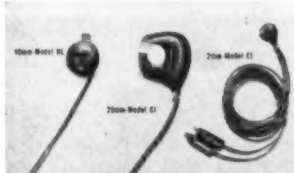
The Transducer in Application

## ELECTRONIC MEDICAL SYSTEMS, INC.

CIRCLE 11 ON READER-SERVICE CARD

1449 UNIVERSITY AVENUE  
ST. PAUL 4, MINNESOTA  
TELEPHONE Midway 6-6367

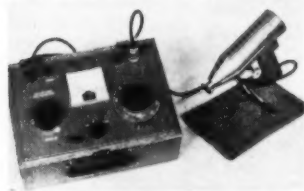
### BLOOD FLOW PROBES



New Flo-Probes for prolonged implantation, as well as for use on exposed vessels in surgery, are now offered in wide range of sizes for use with Micro-flo electromagnetic blood flowmeter. For extracorporeal studies, Model HL Flo-Probes are offered in sizes from 5 to 20 mm. Model CI types, used with exposed vessels, are available in sizes from 1 to 20 mm dia. Probes are encased in non-toxic methylmethacrylate and may be cold sterilized for repeated use.—Medicon Div., Quality Precision Products, Inc., 3700 S. Broadway, Los Angeles 7, Calif.

CIRCLE 130 ON READER-SERVICE CARD

### RADIANT HEAT STIMULUS



New Dolorimeter provides convenient means of applying measurable and controlled radiant heat stimulus to man or experimental animals. Radiant power output is adjusted by dial from 50 to 500 mc/cm<sup>2</sup>/sec, with calibrations every 10 millicalories. Bulletin.—Williamson Development Co., Inc., 317 Main St., W. Concord, Mass.

CIRCLE 131 ON READER-SERVICE CARD

## Electromagnetic Probe Company

3800 Cash Drive  
Winston-Salem, N. C.

Manufacturers of  
High Sensitivity

### BLOOD FLOW TRANSDUCERS

Non-Cannulating  
& Extracorporeal Units

For use with the  
square-wave  
electromagnetic flowmeter

CIRCLE 12 ON READER-SERVICE CARD

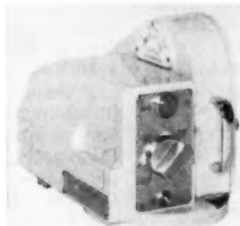
### MULTI-CHANNEL THERMOMETER



New AT-14 Automatic Switching Thermistor Thermometer in either 3, 4, 6, or 12 channels permits fast, accurate consecutive temperature measurements at several locations on same subject or at similar locations on multiple subjects. Fast response, up to 0.4 sec per 20°C change; accuracy of 1% full scale deflection; automatic sequential switching between channels at 15, 30 and 60 sec intervals.—Waters Corp., Box 529, Rochester, Minn.

CIRCLE 132 ON READER-SERVICE CARD

### CAMERA

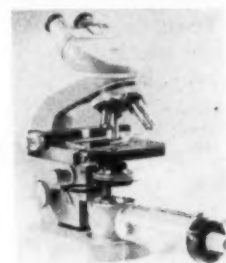


New Model 482 Cinefluorographic Camera reduces radiation dosage, operates with modern fluorographic image intensifier tubes as part of diagnostic X-ray installation. Camera contains polarized synchronous motor and commutators which enable it to control emission by triggering X-ray tube only when shutter is open. Film magazine accommodates 100' or 200' rolls of 35mm film on daylight loading spools.—Photomechanisms, Inc., 15 Stepar Place, Huntington Sta., N. Y.

CIRCLE 133 ON READER-SERVICE CARD

### MICROSCOPES

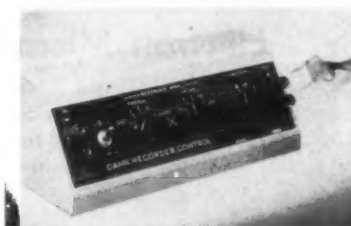
New Elgeet-Olympus medical and research microscopes feature instant interchangeability of monocular, binocular or trinocular tubes, eyepieces



or variety of illuminators. Each interchangeable body rotates through 360°. Model ECBi (shown) is binocular version of basic modular microscope. Model ETTr is trinocular research version incorporating system of integrated binocular viewing with vertical single tube for precision photomicroscopy and closed-circuit TV microscopy.—Scientific Instrument Div., Elgeet Optical Co., 838 Smith St., Rochester, N. Y.

CIRCLE 134 ON READER-SERVICE CARD

### RECORDER CONTROL



New Recorder Control converts any fixed-span recorder to universal multi-range recorder with 15 voltage ranges and 15 current ranges, increases versatility of existing recorders. Unit can also be used with oscilloscopes, providing more accurate calibration and more convenient ranges.—Cahn Instrument Co., Paramount, Calif.

CIRCLE 135 ON READER-SERVICE CARD

## SURE YOU CAN . . .

MEASURE BLOOD FLOW IN INTACT VESSELS\*

Our Square-wave Electromagnetic Flowmeters have been doing this for years.

Two Models Available

CAROLINA MEDICAL ELECTRONICS, INC.  
255 Stanton Drive  
Winston-Salem, North Carolina

\* And in extracorporeal systems, too

CIRCLE 13 ON READER-SERVICE CARD



## tempscribe® BIOLOGICAL REFRIGERATION RECORDER

RANGE  
-5°C  
TO  
+15°C

Makes Permanent 7-Day Continuous Records of Storage Temperatures for Whole Blood, Vaccines, Serums, etc.

- Provides utmost convenience, accuracy and dependability for recording temperatures at which biologicals are stored.
- Designed for hanging or setting outside the refrigerating unit with its temperature-sensitive bulb immersed in glycerin or other liquid within the unit.
- 10-ft. capillary tubing permits placement of both bulb and recorder at the most convenient locations.
- -5°C to +15°C temperature range covers every biological refrigeration requirement.
- Mechanically-operated—unfailingly records temperature in event of electric power failure.
- Seven-day chart makes attention to temperature recording a simple, once-a-week duty—provides record which shows the time as well as the duration of every temperature fluctuation.
- TEMPSCRIBE temperature records are permanent evidence of conformance with Public Health Service Regulations.



Capillary tubing transmits impulse from temperature-sensitive bulb (immersed in glycerin within the book) to TEMPSCRIBE Recorder hung on wall.



For complete particulars write for LEAFLET 892

BACHARACH INDUSTRIAL INSTRUMENT CO.  
200 N. Braddock Ave., Pittsburgh 8, Pa.

Since 1909 Makers of Testing Instruments and Other Precision Devices

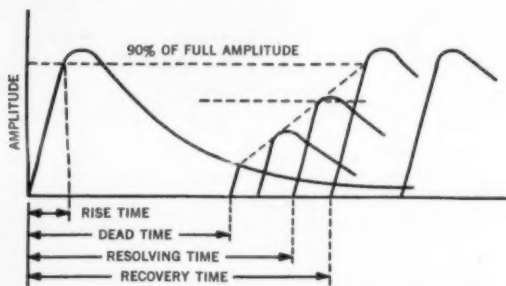
CIRCLE 14 ON READER-SERVICE CARD

### BRIEFS

#### X-Ray Pulses

Rise Time: the time interval from the beginning of a pulse until the pulse reaches 90% of full amplitude.

Dead Time: the time interval after the beginning of a pulse during which the counter is incapable of producing another pulse.



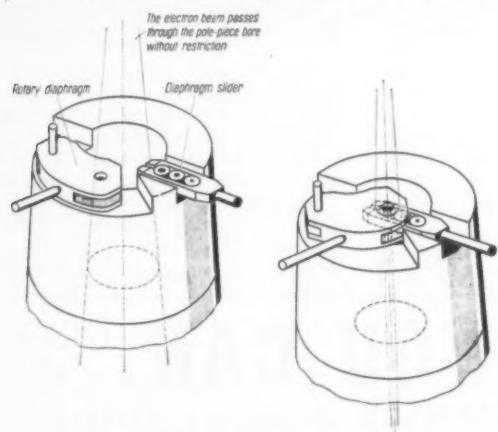
Resolving Time: the time interval after the beginning of a pulse until the tube is capable of a second pulse of sufficient amplitude to trigger the associated circuit.

Recovery Time: the time interval after the beginning of a pulse until the tube is capable of a second pulse of full amplitude . . . (From 40-page Form 3J4228, "RCA X-Ray Diffraction and Spectroscopy Equipment," Radio Corporation of America, Scientific Instruments, Camden, N. J.)

FOR THIS LITERATURE CIRCLE 136 ON READER-SERVICE CARD

#### Electron Microscope

The new ELMISKOP 1 is a valuable instrument of extreme performance and flexibility for use in scientific research . . . Below the object stage the first two main parts of the imaging system, the objective with stigmator and

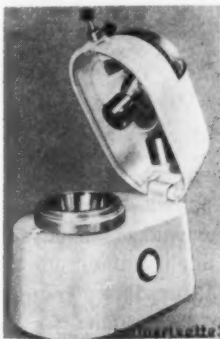


the intermediate lens, are accommodated . . . By means of the diaphragm slider, 3 diaphragms each can be exchanged against each other in the field gap of the objective or before the field gap of the intermediate lens as well as centered to optical axis. The diaphragms can also be removed, which is essential, since for diffraction patterns the unrestricted electron beam is needed . . . (From 24-page brochure, Siemens, Inc., 350 Fifth Ave., New York 1, N. Y.)

FOR THIS LITERATURE CIRCLE 137 ON READER-SERVICE CARD

#### LAB GRINDER

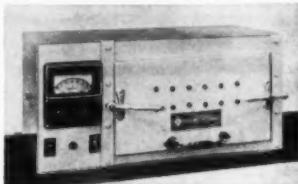
New Pulverisette 2, automatic universal laboratory mortar, permits variation of grinding pressure up to 9 kg, grinds up to 625 cc of wet or dry



materials: medicaments, sugar, alumina, pigments, silicates, etc. Radioactive substances can be ground to analytical fineness (up to 1 micron).—Schuco Scientific, Div. Schueler & Co., 75 Cliff St., New York 38, N. Y.

CIRCLE 138 ON READER-SERVICE CARD

#### THERMAL SHOCK CHAMBER



New Ultratemp/600 table-top Thermal Shock Chamber has a work area of 1/2 cu. ft. Removable, file-drawer type door gives access to the steel chamber (16" x 8" x 8"). Model 600 is designed and instrumented for operation between -100° and +400°F with a 5-minute pulldown and 30-minute warmup.—Cincinnati Sub Zero Products, 3930 Reading Rd., Cincinnati 29, Ohio.

CIRCLE 139 ON READER-SERVICE CARD

#### HEMOPHOTOMETER

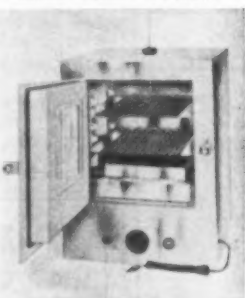
New Model 55 Hemophotometer® for direct-reading of hemoglobin concentration from 2 to 20 gm Hb is accurate to 0.25-gm Hb/100 ml. Unit



measures difference in intensities of two beams of light from same lamp, one partially absorbed by cyanmethemoglobin solution while other goes directly to second photocell. Currents produced oppose each other, so that any change in lamp affects both cells in same way. Two reference solutions for standardizing instruments have same optical absorbance as blood sample diluted with Drabkin's solution. One has absorbance equivalent to blood with 5 gm Hb/100 ml; the other, 14 gm Hb/100 ml.—Fisher Scientific Co., 711 Forbes Ave., Pittsburgh 19, Pa.

CIRCLE 140 ON READER-SERVICE CARD

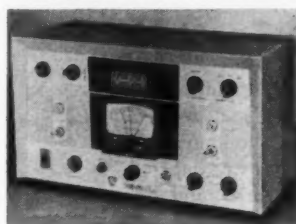
#### MED LAB OVENS



New Med-Lab Model 6500 and 6520 Incubation/Sterilization Ovens give accurate temperature control from room to 180°C ± 1/2°C for low temperature incubation, sterilization, paraffin embedding and chemical baking. Model 2307 Electric Furnace with range to 1950°F is for laboratory ashing, dehydration and PBI determinations. Model 6170 Portable Oven has heat range from ambient to 200°C ± 1/2°C.—Hydor Therme Corp., 7301 Melrose St., Phila. 35, Pa.

CIRCLE 141 ON READER-SERVICE CARD

#### CARDIAC MONITOR



New AO Cardiometer, developed in cooperation with Dr. K. William Edmark, cardiologist and surgeon of Seattle, Washington, combines functions of four instruments—Cardiotachometer, ECG Scope, Automatic Pacemaker and continuous Internal-External Pacemaker—in one unit. Cardiometer records Direct Heart-Rate Readout in beats per minute on large, easy-to-see dial. Dual Alarm System sounds at preset minimum and maximum tolerances to warn of asystole tachycardia, flutter and fibrillation. ECG on Built-In Oscilloscope allows continuous observation of QRS Complex and gives simultaneous display of pace signal when patient is under pacemaker control. Pacemaker delivers 5-msec stimulus up to 100 volts at a rate of 15 to 175 beats/minute. Connections to instrument are extremely simple, allowing patient freedom of movement while being monitored or paced.—American Optical Co., Instrument Div., Buffalo 15, N. Y.

CIRCLE 142 ON READER-SERVICE CARD

#### INTRACARDIAC CATHETERS

New Model 191 Single Lumen Phonocatheter for sound pickup only is approximately 2mm (#5 French) in diameter, 150-cm length. Model 192 Double Lumen Phonocatheter for simultaneous sound pickup and blood sampling can also be used to take intracardiac blood pressures. It is fitted with a standard Luer Slip fitting and is 3mm (#8 1/2 French) in diameter, 150 cm long. Both are very flexible and particularly adaptable for use with infants.

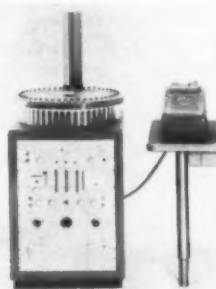
New Model 188 is for audio and ECG pickup. Model 189 has a platinum tip and is designed for audio ECG pickup and for use as an electrode in hydrogen studies (all at one time!).

Both the Model 188 and 189 are designed with metal tips and are made from a standard Radiopaque Nylon catheter. These units are considerably more rugged and are recommended for use when the more fragile and flexible 191 and 192 catheters are not required.—American Electronic Laboratories, Inc., Richardson Rd., Colmar, Pa.

CIRCLE 143 ON READER-SERVICE CARD

#### AUTOMATIC SAMPLE CHANGER

A new automatic sample changer, Model C120, for use with well-type scintillation detectors holds as many

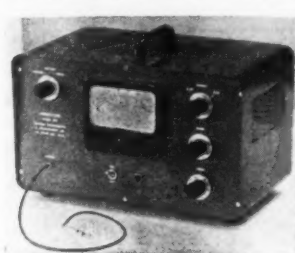


as 49 test tubes containing gamma-emitting liquid or solid samples. During operation, the instrument automatically lowers the test tubes in proper sequence into the well crystal of a shielded scintillation detector for measurement. The changer is used with standard scalars and well detectors which are already available in most radioisotope laboratories. At the end of each sample measurement, a printing timer records the sample identity number and the length of time required to reach a preset count. The procedure is repeated until all samples have been counted automatically. The system can be left unattended and the printed data collected when convenient.—Nuclear-Chicago Corp., 359 E. Howard Ave., Des Plaines, Ill.

CIRCLE 144 ON READER-SERVICE CARD

#### NITROGEN METER

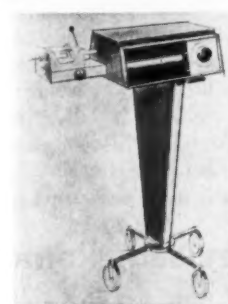
New Model 105 clinical Nitralyzer for teaching and clinical laboratories measures significant nitrogen percentage ranges in physiological gas mix-



tures of nitrogen, oxygen, water vapor and carbon dioxide. Permits tests of time course of body denitrogenation (nitrogen washout test); measurements of lung volume, respiratory dead space and abnormalities in distribution of inspired gas. Two scales are provided: one reads 0-80% nitrogen within 1% accuracy; the other, 0-20% within 0.5%.—Med-Science Electronics, Inc., (formerly Custom Engineering and Development Co.), 2647-49 Locust St., St. Louis 3, Mo.

CIRCLE 145 ON READER-SERVICE CARD

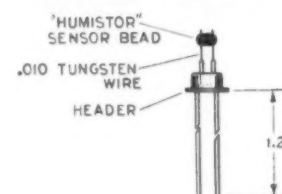
#### CONTRAST MEDIUM INJECTOR



New general purpose Injector is for angiocardiac visualization involving spot film, serial film and cine techniques. Syringe rotates into vertical position during filling. Manipulation of Fill-Retract control on front panel quickly frees system of air bubbles. Contrast medium shows through transparent, high-pressure cylinder of syringe, and is maintained at preset temperature by thermostatically-controlled heating system in syringe holder. Bar-knob control provides pressures up to 800 psi. Push-button initiates injection, may be operated remotely. X-ray trigger control panel connected to X-ray machine permits triggering at beginning or end of injection. Also available: X-ray Trigger Module, which can be preset at any value to 5 sec; Serial Injection Module that permits serial injection of preset amounts; ECG Programmer Module that permits injection to be controlled by R-wave of ECG. Time-delay dial sets at any value between 0 and 1 sec.—Cordis Corp., 241 N.E. 36 St., Miami 37, Fla.

CIRCLE 146 ON READER-SERVICE CARD

#### HUMIDITY DETECTOR



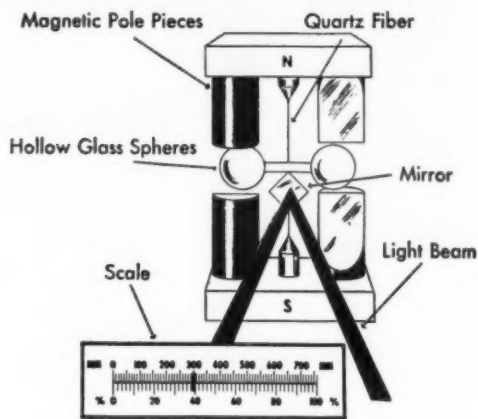
New Humistor Model H-160-3 detects and measures vapor or gases which exhibit an electric dipole moment (water vapor, ozone, etc.). It operates by measuring the change in resistance, which is proportional to the concentration of the dipole moment of the ambient gas. Speed of response is instantaneous in free air. Readout may be via conventional megohmmeter or a megohm bridge. The Humistor is usable for monitoring respiration, therefore can be used for remote observation of post-operative or critical patients. Resistance in air at 25°C and 25% relative humidity (RH) is 1000 megohms; resistance at 25°C and 98% RH is 1 to 2 megohms.—Conrad-Carson Electronics, Inc., 1347 Broadway, El Cajon, Calif.

CIRCLE 147 ON READER-SERVICE CARD



## How Oxygen Analyzers Work

Beckman Oxygen Analyzers work on a simple physical principle—the magnetic susceptibility of oxygen. Oxygen is unique among gases in being strongly paramagnetic (attracted into a magnetic field). Other gases are, with



few exceptions, slightly diamagnetic (repelled out of a magnetic field). Thus, by measuring the magnetic susceptibility of a gas, normally its oxygen content can be accurately determined . . .

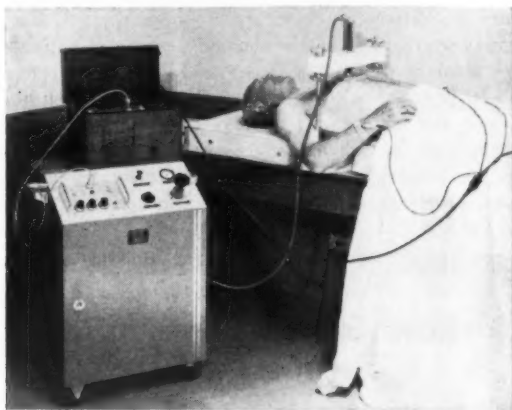
The heart of the oxygen measurement system is a small glass dumbbell suspended on a taut, durable, quartz fiber in a non-uniform magnetic field. When no oxygen is present, the magnetic force exactly balances the torque of the quartz fiber and the dumbbell remains stationary . . .

When a gas sample containing oxygen is drawn into the test chamber surrounding the dumbbell, the magnetic force is altered. This change in force allows the dumbbell to rotate. The degree of rotation is proportional to the change in force; the change in force is proportional to the oxygen concentration in the sample . . . Anesthetists use the Oxygen Analyzer to check mixture of anesthetic gases during surgery. Other medical applications include monitoring oxygen supply in incubators, oxygen tents, inhalators . . . (From 6-page Bulletin 750, Scientific and Process Instruments Div., Beckman Instruments, Inc., 2500 Fullerton Rd., Fullerton, Calif.)

FOR THIS LITERATURE CIRCLE 148 ON READER-SERVICE CARD

## Electrocardiac Massage Machine

The Harkins-Bramson machine, utilizing the Johns Hopkins method of closed-chest cardiac massage, delicately controls the circulation of patients in cardiac arrest and extends the use of the same principle to support the failing but still beating heart. Thus, for the first time, there is an available means of directly supporting the circulation of patients in heart failure . . .



The cardiac massage unit is placed astride the thorax of the patient with the massaging pad in contact with the lower sternum. The posterior brace transmits the necessary reaction forces to the vertebrae directly below the pad. Lateral movement of the patient is prevented by two adjustable wedges while a divided mattress makes the position comfortable for the subject. A source of compressed gas provides the energy that drives the massaging piston pad . . .

Pressure over the lower sternum during cardiac arrest compresses the heart against the vertebral column and forces blood out of the ventricles of the heart . . . A repetitive or pulsating force correctly applied over the sternum produces a sufficient cardiac output to maintain life during cardiac arrest. This method of cardiac massage has become the preferred treatment for the emergency of cardiac arrest, for several reasons. It is more quickly applied than open chest massage; does not require surgery, does not lead to infection; can be used by non-professional personnel; and produces better circulation than open-chest cardiac massage . . . (From new brochure, Hallikainen Instruments, Slaco Div., 1341 Seventh St., Berkeley 10, Calif.)

FOR THIS LITERATURE CIRCLE 149 ON READER-SERVICE CARD

## The NEW NURSE'S AIDE

The FOXGLOVE physiological monitor is a big help to the nurse wherever her job involves checking and recording of physiological data. It is the only instrument that provides the information in numbers. FOXGLOVE gives the nurse more time to devote to her patient. In the operating room, recovery room or intensive therapy ward . . . FOXGLOVE gives a continuous reading of up to six measurements in easily read numbers and on an automatically plotted chart for permanent record, as well as EKG and EEG recording and monitor scope display. The trend and current condition of the patient is always readily accessible.

Read respiration, heart rate, blood pressure, temperature, skin resistance, medication flow, urine output and many other measurements at a distance. The FOXGLOVE System displays the information in large numbers to allow the nurse to carry on her other activities and still see the figures on the display panel from anywhere in the room.

FOXGLOVE is simple to use. There are no knobs to turn or adjustments to make. Just attach the pickup to the patient and read the data off the display panel.

FOXGLOVE features an automatic alarm system. Merely dial in pre-set limits for any reading. The alarm system goes on if the patient deviates from the pre-set limits.

The FOXGLOVE System will monitor one patient or a ward and is available in mobile or permanent installations.

Write for your copy of the brochure describing FOXGLOVE, the new nurse's aide.

### STARLING CORPORATION

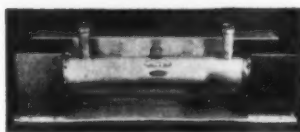
2047 SAWTELLE BOULEVARD, LOS ANGELES 25, CALIFORNIA, U.S.A. • BRADSHAW 2-7131

ASPEN AD ASTRA

CIRCLE 15 ON READER-SERVICE CARD



## ELECTRONIC WATER STERILIZER



New Ultraviolet Ray Water Sterilizer achieves bacteria reductions in the order of 99 to 100% instantly as the water is used; eliminates storage tank heating and cooling cycles, chemical additives; does not alter the pH or chemical structure. Unit is very effective in destruction of gas-forming bacteria. The equipment features easy installation and maintenance, low operating cost, stainless steel or PVC construction, and flow rates from 300 to 10,000 gph. Larger flow units available.—Water Processing Associates, 1815 W. Chapman Ave., Orange, Calif.

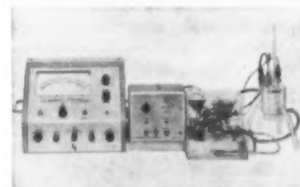
CIRCLE 150 ON READER-SERVICE CARD

## CASCADE IMPACTOR FOR AIR SAMPLING

New cascade impactor, developed for efficient field sampling by the Health and Safety Laboratory of the U. S. Atomic Energy Commission, performs accurate particle size analysis of almost all industrial atmospheres. A built-in slide movement mechanism permits the collection of eight times more sample on each stage than on a corresponding fixed collection surface, increasing the reliability of the analysis without overloading the collecting surfaces. It can be used with any efficient low volume air sampler such as Unico Models 10, 30, and Constant Rate Uni-Jet Air Sampler. The calibration is based on microscopic sizing and is applicable to any flow rate between 2 and 40 lpm and any particle density between 0.8 and 20 gm/cc.—Union Industrial Equipment Corp., 40 Beech St., Port Chester, N. Y.

CIRCLE 151 ON READER-SERVICE CARD

## BLOOD ANALYZING SYSTEM



New IL-113 direct-reading system for rapid, accurate determinations of pH, pCO<sub>2</sub>, and pO<sub>2</sub> of blood, measures all three parameters in less than 3 minutes using 1.5 cc of blood. Ranges are 6.8 to 8.0 pH, 10 to 100 mm Hg pCO<sub>2</sub>, and 0 to 800 mm Hg pO<sub>2</sub>. Accuracy exceeds  $\pm 0.005$  pH,  $\pm 0.5$  mm Hg at 40 mm pCO<sub>2</sub> and 1% pO<sub>2</sub>.—Instrumentation Laboratory, Inc., 108 Cummings St., Boston, Mass.

CIRCLE 152 ON READER-SERVICE CARD

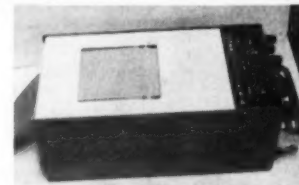
## TIMING LIGHT GENERATOR



New miniature (3" by 4" by 6") HS-10600 Timing-Light Generator for high speed cameras operates on 110-v ac using attached transformer, or direct from any 12-v dc source. Up to four #51 or 51H or equivalent lamps can be fired at rates of 100 or 1000 pips per second. Pulse duration is 30 microsec with accuracy of 0.1% at 1000 cps. Output is 200-v minimum.—Fairchild Camera and Instrument Corp., Industrial Products Div., 580 Midland Ave., Yonkers, N. Y.

CIRCLE 153 ON READER-SERVICE CARD

## DIRECT WRITING RECORDER



New Model 444 Ultragraph 4-6 channel Direct Writing Light Beam Oscillograph uses low cost tungsten light source. Direct writing is accomplished by exposing light beam galvanometer traces on commercially available direct-print paper. Developing is by post-exposure latensification. Features: instant selection of recording speeds—1, 5, 10, and 50 ips; galvanometer spots visible at recording point; optional 0.1" spacing, every fifth line accentuated.—Century Electronics & Instruments, Inc., 1333 N. Utica Ave., Tulsa 10, Okla.

CIRCLE 154 ON READER-SERVICE CARD

## AUTO-GAMMA SPECTROMETER

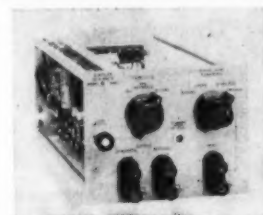


New 2 1/2' wide console for Auto-Gamma Spectrometer System features convenient counter-height loading of sample changer, automatically counts and records data from as many as 100 test tube samples, allowing around-the-clock operation. Results of count are printed out on digital printer in upper section of console. Printer automatically records sample number, time and scaler counts.—Packard Instrument Co., Inc., Dept. 1A, Box 428, La Grange, Ill.

CIRCLE 155 ON READER-SERVICE CARD

## OSCILLOSCOPE DISPLAY SCANNER

New Model 166C Display Scanner plus 160B or 170A Oscilloscope and X-Y recorder permits large scale X-Y recordings of displayed waveform to

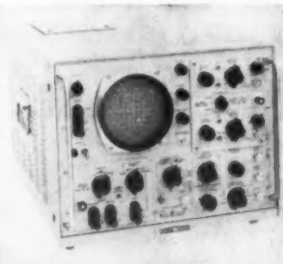


obtain permanent high resolution records of repetitive waveforms. Provides clearer and larger records not limited by width and height of CRT size. Automatic pen stabilizer provides nearly constant writing rate signal to recorder so that fast pulses may be recorded faithfully in minimum time.—Hewlett-Packard Co., 1501 Page Mill Rd., Palo Alto, Calif.

CIRCLE 156 ON READER-SERVICE CARD

## OSCILLOSCOPES

New Model 160B 15 Mc and Model 170A 30 Mc Oscilloscopes accept plug-in vertical amplifiers and time axis plug-in units. Horizontal amplifier



provides sweep magnification of 1, 2, 5, 10, 20, 50 and 100 times; multitrack positioning control provides fine horizontal adjustment so that any 10-cm portion of magnified scale can be examined.—Hewlett-Packard Co., 1501 Page Mill Rd., Palo Alto, Calif.

CIRCLE 157 ON READER-SERVICE CARD

## WARBURG RECORDER

New Auto-Warburg automatically reads, calculates, and charts Warburg data directly in microliters. It attaches to standard Warburg apparatus and works for most manometric techniques. It saves time and labor, eliminates errors, permits expanded use of Warburg techniques. Overall precision,  $\pm 1\%$ . Corrected readings in microliters are plotted with 16-channel multi-point recorder.—Mechrolab, Inc., Mountain View, Calif.

CIRCLE 158 ON READER-SERVICE CARD



## A NEW RINGING-INTERVAL PRECISION - TIMER

- ★ Marks any length of time from 1/4 minute to 2 hours with a 10 second bell signal
- ★ Runs for 30 hours with one winding
- ★ Time is set by the center knob
- ★ Side levers energize alarm and start clock

The case is made of durable metal and is attractively finished in black wrinkled enamel which outlasts cases made of plastics.

Dial is 3 1/2 ins. in diameter. Timer measures 4 3/4" x 4 1/4" x 2 1/4" and weighs 20 ounces.



Cat. No. ME46275 . . . Timer . . . each \$11.90



CIRCLE 16 ON READER-SERVICE CARD

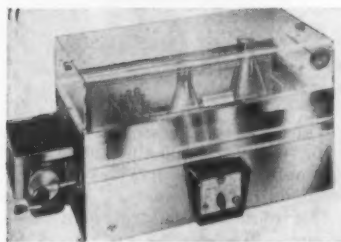
### ELECTROMAGNETIC FLOWMETER



New Square-Wave Electromagnetic Flowmeter measures volumetric blood flow through any surgically exposed artery or vein, cannulated or non-cannulated. It provides data on drug effects, transplants, vascular anomalies, surgical evaluations, and extracorporeal systems. Model 201 Flowmeter has single output with provisions for recording either pulsatile (phasic) or mean flow. Model 202 Flowmeter has dual outputs for recording simultaneous pulsatile and mean flow characteristics from a single probe—non-cannulating or "surgical" probes, chronic implantation type probes, and cannulating probes for extracorporeal circulations. Surgical types fit arteries or veins from 5 to 100 mm outside circumference. Extracorporeal sizes fit 1/4", 3/8" and 1/2" I.D. tubing.—*Carolina Medical Electronics, Inc.*, 255 Stanton Dr., Winston-Salem, N. C.

CIRCLE 159 ON READER-SERVICE CARD

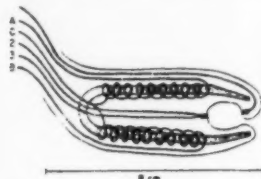
### HOT AIR SHAKING- INCUBATOR



New Hot Air Shaking-Incubator Model 3570 in regular and king sizes holds up to 200 20-ml beakers or 162 25-ml Erlenmeyer Flasks. Temperature range is up to 65°C, uniformity within  $\pm 1/2^\circ\text{C}$ . Removable, universal-type tray permits loading at bench. Stainless steel springs or clips hold assorted glassware from 20-ml to 2000-ml size, at the same time. Lucite hood permits visibility of test conditions. Positive "through-the-wall" shaking action is infinitely variable. Adjustable action has reproducible speeds to 400 strokes per minute, with controlled strokes from 0" to 2 1/4" length. Thermo-plate heater is fully enclosed, eliminates hot spots. Bulletin 185.8.—*Labline, Inc.*, 3070 W. Grand Ave., Chicago 22, Ill.

CIRCLE 160 ON READER-SERVICE CARD

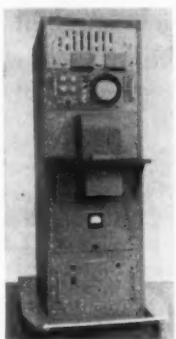
### NON-CANNULATING PROBES



New Model EMP-100, miniaturized Model EMP-100c, and Model EMP-200 electromagnetic probes are used with Square-Wave Flowmeter to measure blood flow without cannulating arteries and veins.—*Electromagnetic Probe Co.*, 3800 Cash Dr., Winston-Salem, N. C.

CIRCLE 161 ON READER-SERVICE CARD

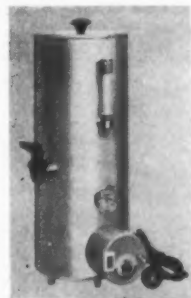
### AUTOMATIC COLONY COUNTER



New Model 3003T Automatic Colony Counter determines number of bacterial colonies on Petri dish cultures in 1 sec, then displays or prints total. It relieves bacteriologists of tedious counting by electronically scanning and discarding information. Sliding mechanism transfers Petri dishes to and from counting head. Monitoring cathode ray tube displays video and waveform presentation of Petri dish contents.—*Telechrome Manufacturing Corp.*, 185 Dixon Ave., Amityville, N. Y.

CIRCLE 162 ON READER-SERVICE CARD

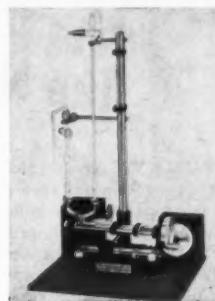
### PARAFFIN DISPENSER



New, improved heated paraffin dispenser and melter (designed in cooperation with Dr. Benjamin Castleman, Chief Pathologist, and his staff at Massachusetts General Hospital) melts paraffin and keeps it at constantly controlled temperature on tap for instant use. Paraffin is drawn off through simple action, non-clogging, self-closing faucet.—*Barnstead Still and Sterilizer Co.*, Lanesville Terrace, Boston 31, Mass.

CIRCLE 163 ON READER-SERVICE CARD

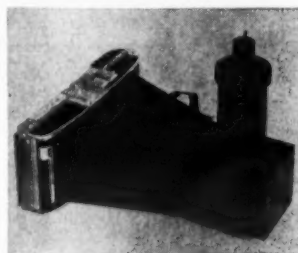
### BLOOD GAS APPARATUS



New Natelson Microgasometer for blood gas tests requires 0.03-ml sample for accurate quantitative determination of  $\text{CO}_2$ ,  $\text{O}_2$ ,  $\text{CO}$ , and  $\text{N}$  in blood, plasma, or other fluids. Instrument is self-contained, portable, simple to use. Test results are quick (5 minutes for  $\text{CO}$ ), accurate (1% for routine determinations). Accessories available: microburette attachment, motorized shaker, teflon stopcock reaction chamber.—*Scientific Industries, Inc.*, 220-05 97th Ave., Queens Village, L. I., N. Y.

CIRCLE 164 ON READER-SERVICE CARD

### AIRBORNE-PARTICLE CAMERA



New 8-lb Model 500 Airborne-Particle Recording Camera produces finished photographic records of particulate distribution and concentration 10 seconds after drawing of sample. Built-in injector draws air sample into examination chamber. Photographic prints, for size analysis by a standard grid, or slide transparencies enable study of particles 1 micron in size and larger. Applications: field analysis of size distribution of aerosol, air pollution control and enforcement, filter analysis, clean room control.—*Royco Instruments, Inc.*, 440 Olive St., Palo Alto, Calif.

CIRCLE 165 ON READER-SERVICE CARD

### HUMIDITY METER

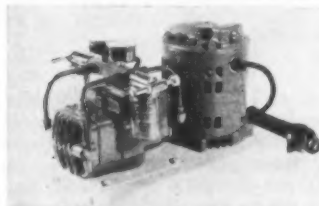


New portable Model 100 Humidity-Meter permits rapid and precise measurement of humidity in operating room, incubators, oxygen tents, etc., where measurement and/or control of humidity is vital. Semiconductor Humistor sensing element in probe indicates humidity within  $\pm 2\%$ . Also new Model 200 Humidity-Meter incorporates meter relay and provides both measurement and control of external apparatus such as humidifiers, dehumidifiers, signaling systems, etc.—*Telostat Corp.*, 1003 First St. S., Hopkins, Minn.

CIRCLE 166 ON READER-SERVICE CARD

### NON-CONTAMINATED-AIR PUMP

New Model G-5 continuous-duty DIA-PUMP delivers non-contaminated air or gas sample. It is used as sampling pump, to operate vacuum

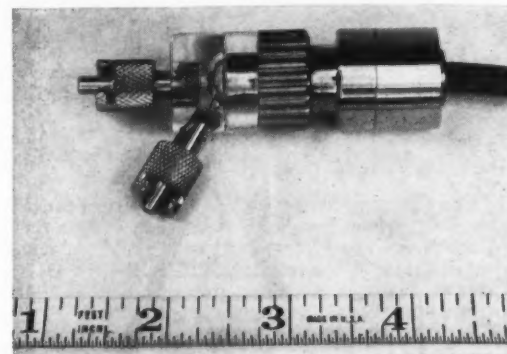


pickups, aerate liquids, power dehydration systems, etc. Explosion-proof motors are available.—*Air Control, Inc.*, 460 Narberth Ave., Narberth Pa.

CIRCLE 167 ON READER-SERVICE CARD

## Physiological Pressure Transducers

Developed especially for the exacting requirements of cardiovascular research, the P23 Model Series of manometers has become the most widely respected line in the dynamic field of physiological pressure measurement.



Based on the reliable unbonded strain gage transducer principle, these instruments offer an outstanding combination of service-proved features.

The transparent pressure dome has been designed for the elimination of response-robbing air bubbles. Unobstructed visibility is provided for ease in their detection and the inner chamber is shaped to facilitate ejection with minimal flushing.

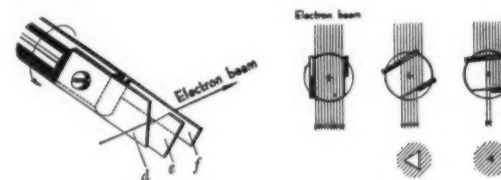
The entire transducer and attached cable (with the exception of the electrical connector) may be immersed in alcohol or germicidal solutions. The dome is easily removed to allow thorough cleansing.

Several types have been developed within this series to serve the variety of needs in the medical and biological fields. The miniature case size features very low volume displacement for high dynamic performance . . . (From new brochure, *Jess Burns, Statham Instruments, Inc.*, 20 Stern Ave., Springfield, N. J.)

FOR THIS LITERATURE CIRCLE 168 ON READER-SERVICE CARD

## Electron Diffraction

Selected area diffraction is electron diffraction from a small selected area on the image. Any area of an image can be selected by the diffraction aperture . . . The variable diffraction aperture of the Tronscope TRS-50 EI is

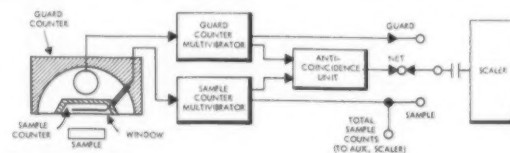


triangular in shape and variable in size and position . . . When the diffraction aperture is contaminated, the triangular aperture is easily cleaned because it consists of three straight wedges (d), (e) and (f). The Tronscope TRS-50 EI is provided with an additional specimen holder between the objective lens and the intermediate lens; transmission as well as reflection diffraction patterns of high resolution can be obtained . . . (From 16-page brochure, *Cincinnati Div., Bendix Aviation Corp.*, 3130 Wasson Rd., Cincinnati 8, Ohio.)

FOR THIS LITERATURE CIRCLE 169 ON READER-SERVICE CARD

## Low Background Beta Counting

The Omni/Guard System, available in manual or automatic versions, features a choice of sample size, guaranteed ultra low background, guaranteed high counting efficiency, compact shielding and moderate cost . . .



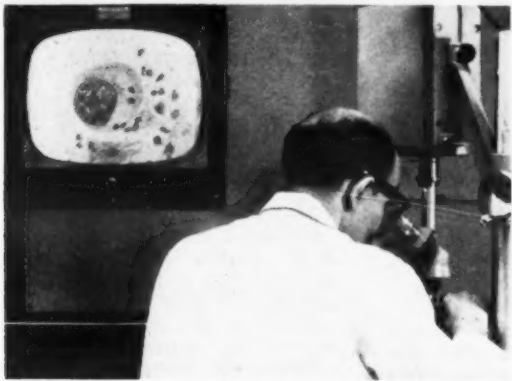
Mono/Mol ultra thin window Flow Counters make it possible to capitalize on the low background by providing superb counting efficiency even for low energy beta rays ( $\text{C}^{14}$ ,  $\text{S}^{35}$ , etc.). With very low background and high efficiency, less starting material is required, lower activity levels can be measured and counting time is substantially reduced . . . By extending the range of detection sensitivity farther than ever before, it opens a new era of instrumental analysis in the fields of Health Physics, Environmental Analysis, Radiochemistry, Geochemistry, Biochemistry and Clinical Research . . . (From 8-page Bulletin, *Tracerlab*, 1601 Trapelo Rd., Waltham 54, Mass.)

FOR THIS LITERATURE CIRCLE 170 ON READER-SERVICE CARD



## Closed-Circuit TV Microscopy

Closed-circuit Television adds a new dimension to microscopy and reduces the time and cost of teaching . . . The many advantages of TV microscopy have simplified study and research in all fields where the microscope is



the principal tool, as in cytology, histology, mycology, parasitology, bacteriology, histopathology . . . Problems of definition formerly associated with enlargement of microscopic specimens have now been solved. Specimens on the screen retain all their identifying characteristics . . . and there is little possible injury to living organisms in phase contrast studies. Electronic magnification and 600 line resolution guarantee high definition and minimal interference from external sources. TV microscopy can achieve magnification suitable to the subject while maintaining resolution almost as perfect as that directly under the microscope . . . (From new brochure, Video Engineering Co., Inc., Riggs Rd. at First Place, N. E., Washington 11, D. C.)

FOR THIS LITERATURE CIRCLE 171 ON READER-SERVICE CARD

## Infusion-Withdrawal Pumps

The 600 Series pumps comprises a wide range of pumping instruments for the infusion and withdrawal of varying quantities of liquids with a high degree of accuracy . . . Models are made by combining one or more basic

Model No.	Driving Mechanisms	Pumping Mechanisms	Solenoid Valves
600-950			
600-960			

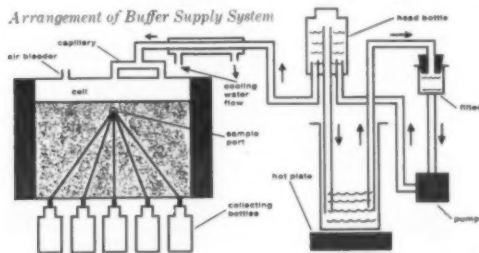
pump mechanisms with multi-speed transmissions driven by synchronous reversible instrument motors. In order to achieve continuous and automatic pumping and withdrawal action, solenoid-operated valves have been added to the more complex models . . .

Servo-controlled infusion pumps . . . permit the control of the rate of infusion or withdrawal in accordance with an electrical signal . . . produced by a variety of devices. The signal is usually a function of some characteristic that is intended to be kept under control. As an example, a blood pressure transducer can be used to control the injection of Nembutal to maintain blood pressure constant . . . (From 8-page Data Sheet 900 and 2-page brochure, Harvard Apparatus Co., Inc., Dover, Mass.)

FOR THIS LITERATURE CIRCLE 172 ON READER-SERVICE CARD

## Continuous Electrophoresis Apparatus

The JKM-Stubbings Apparatus . . . makes electrophoresis a practical technique for the preparation of pure biochemical materials . . . The Stubbings cell carries



out the separation in a 1/2" thick bed of extremely uniform Pyrex brand glass microspheres. The bed is 12" wide and 13" deep from the point where the sample is injected. The spheres or beads are specially cleaned and screened . . . There is no channeling, no void formation, and little tendency for the individual components to diffuse sideways into the bed, once they have begun to separate. Definition is consequently extremely sharp . . . most components will be found in a single collecting bottle . . . (From 8-page Bulletin FS-236, Fisher Scientific Co., 711 Forbes Ave., Pittsburgh 19, Pa.)

FOR THIS LITERATURE CIRCLE 173 ON READER-SERVICE CARD



## High Intensity Sonifier®

- extreme power, 20 KC, portable
- small quantity and continuous
- flow attachment, power selection
- performs most difficult homogenizing, emulsifying, cell breakdown
- excellent enzyme activity

Heat Systems Co., 777 Northern Blvd., Great Neck, L. I.

©Branson Instruments, Conn.

CIRCLE 17 ON READER-SERVICE CARD

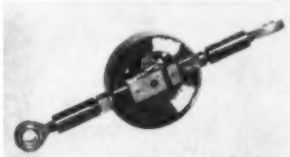
## CARDIAC MONITOR-STIMULATOR



New transistorized Cardiac Sentinel continuously monitors cardiac rate by means of wires placed in heart or through external electrodes on patient's chest. If cardiac rate falls below preset level, Sentinel triggers ventricular systole, starts heart to beat at rate preset on instrument. "Twin-T-Filter" in circuit reacts only to cardiac "R" wave and disregards all other wave forms and signals. Included with Cardiac Sentinel are monitor patient cable, pacemaker patient cable, and set of external electrodes.—Medtronic, Inc., 3055 Highway 8, Minneapolis 18, Minn.

CIRCLE 174 ON READER-SERVICE CARD

## FORCE MEASURING TRANSDUCERS



New Force Measuring Transducers (Load Cells) for both tension and compression loads employ basic ring configuration with Microdot high temperature weldable strain gages (resistance wire type) in bridge configuration as sensing elements. Added link in center of ring permits considerable overload without destroying calibration. Load range (full scale) is 100 to 500,000 lb; impedance, 120-ohm bridge. Input voltage is 10 v recommended, 15 v max allowable. Output voltage is 2.5 mv, input voltage full scale; 25.0 mv, full scale for 10-v input. Total error from all causes is maintained less than ±1% over temperature range of -300° to +750°F.—Microdot, Inc., 220 Pasadena Ave., South Pasadena, Calif.

CIRCLE 175 ON READER-SERVICE CARD

—PLAN TO ATTEND—  
2ND ANNUAL SAN DIEGO  
SYMPOSIUM AND EXHIBIT ON  
BIOMEDICAL ENGINEERING  
JUNE 20-22, 1962  
For details see page 32.

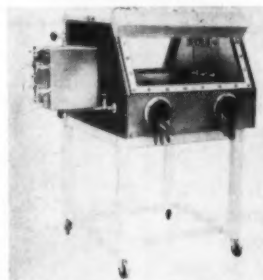
## GAS CHROMATOGRAPH



New Model 154-L Vapor Fractometer low-cost gas chromatograph retains high performance components used in P-E's wide range instruments and includes 1-mv Leeds & Northrup recorder. All Perkin-Elmer accessories can be used with the instrument. Applications include routine control lab analyses, light gas analyses (Orsat type, respiratory gases and light hydrocarbons).—Perkin-Elmer Corp., Norwalk, Conn.

CIRCLE 176 ON READER-SERVICE CARD

## GLOVE BOXES

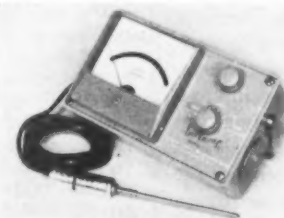


New line of double faced Glove Boxes has interior dimensions 36" x 42" x 23". Interchangeable parts allow modification for controlled atmosphere, radiochemistry, and bacteriology or virology applications. Enclosures have removable end panels so that two or more units can be attached together to provide any length desired.—Kewaunee Scientific Equipment, 4062 Logan St., Adrian, Mich.

CIRCLE 177 ON READER-SERVICE CARD

## CLINICAL THERMOMETER

New Ins-Temp Model T-101 Electronic Clinical Thermometer measures oral, rectal, and axillary temps within seconds. Range is 70° to 110°F with accuracy of ±0.2° over clinical range.

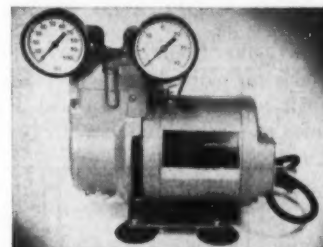


Consists of thermal probe and indicator unit. Power is supplied by mercury-cell 1.5-volt battery which can be used for approximately one year under normal operation.—Craig Instrument Corp., 420 Division St., Long Branch, N. J.

CIRCLE 178 ON READER-SERVICE CARD

Microbiology  
Biochemistry  
Pathology  
Pharmacology

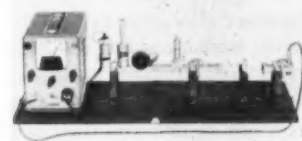
## VACUUM-PRESSURE PUMP



New low-cost Model 13152 Vacuum/Vacuum-Pressure Pump is quiet, reliable source for 1-cfm vacuum and pressure. Features easy-to-read vacuum and pressure gages, built-in moisture eliminators, aftercoolers, pulsation chambers, intake filters, vibration mounts, and mufflers. Applications include oil-free air source for lab instruments, vacuum source for filtrations, compressed air source for therapeutic equipment.—Gelman Instrument Co., 106 N. Main St., Chelsea, Mich.

CIRCLE 179 ON READER-SERVICE CARD

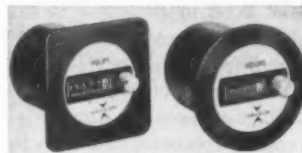
## MICROWAVE DEMONSTRATOR



New low-cost Ed-Set portable demonstration unit simplifies study of energy radiation at speeds of light, allows signals to be sent 30', and interference patterns to be plotted and calculated. It includes power supply, amplifier, tube mount, frequency meter, attenuator, slotted line, crystal detector, accessories, and instruction manual. Ed-Set approximates standards of laboratory precision sufficient to measure speed of light within 9%.—Budd-Stanley Co., Inc., 175 Eileen Way, Syosset, N. Y.

CIRCLE 180 ON READER-SERVICE CARD

## ELAPSED TIME INDICATOR

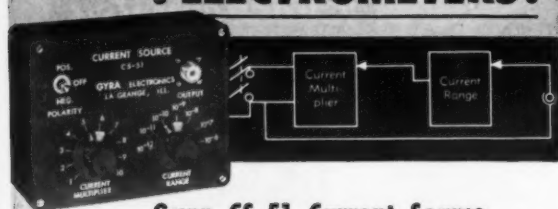


New Elapsed Time Indicator registers hours and tenths, minutes and tenths to 99999.9 for use on any equipment where an accurate record of operating time is desired. Direct reading counter and large, clear numbers assure easy reading. Bezel is 3 1/2" dia or 3" x 3" square in resettable and non-resettable models. Input is 5.0 w at 60 cycles or 3.4 w at 50 cycles.—Haydon Div., General Time Corp., 245 E. Elm St., Torrington, Conn.

CIRCLE 181 ON READER-SERVICE CARD



## Calibrated Current Source for testing ELECTROMETERS!



### Gyra CS-51 Current Source...

offers a convenient method of verifying ELECTROMETER calibration... essential for accurate Gas Chromatography and other applications of ELECTROMETERS! Provides 70 accurately calibrated increments of current between 1  $\mu$ A and 10  $\mu$ A for checking the electrometer input tube sensitivity, (which may have been overloaded with resultant loss of emission on a preceding application) thermal drift and other causes of calibration deviations. Current is derived from self-contained mercury cells. Write for Gyra CS-51 Bulletin No. 700.

Other products of Gyra Electronics Corporation are Electrometers, and stabilized power supplies for laboratory research.

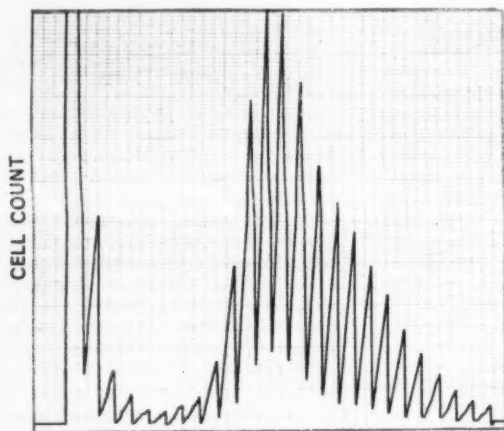
## Gyra ELECTRONICS CORPORATION

Phone: Fleetwood 4-4644  
P.O. Box 184 M1 LaGrange, Illinois  
CIRCLE 18 ON READER-SERVICE CARD

### BRIEFS

## Blood Cell Counter and Plotter

The Coulter Counter may exceed 60 counts per hour, invariably far more accurate and reliable than a "calibrated eyeball." Particles are counted 1 by 1, permitting expanded research techniques. This rapid and precise count-



SIZE Cubic microns

ing and sizing method ends an historical barrier to investigation. Projects previously restricted because of counting limitations are accelerated...

The Coulter Particle Size Distribution Plotter, a complement to the Model B Research Counter, automatically plots complete cell size distribution in 100 seconds... In 100 seconds, a graph is recorded which may be read against other reference curves. Such comparisons may be especially invaluable in determining cell growth studies, effects of radiation on cell size, and other applications. Cell size data may be recorded for platelets, protozoa, white cells and red cells, bacteria, yeast and tissue cells... (From new brochure, Coulter Electronics, Inc., 2525 N. Sheffield Ave., Chicago 14, Ill.)

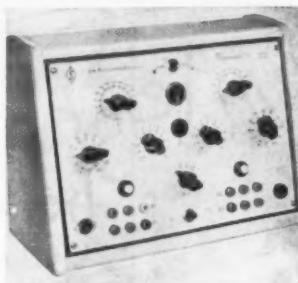
FOR THIS LITERATURE CIRCLE 182 ON READER-SERVICE CARD

## Film Badges

The "rem" dosage received by the body under neutron irradiation is difficult to determine accurately because the damage done to the body is a function of the neutron energy encountered, and for high neutron doses, the neutron-track film does not yield precise data. The Con-Rad Threshold Detector gives an accurate "rem" dosage determination because it provides a measure of the neutron energy spectrum as well as the intensity of radiation. This unit is based on an Oak Ridge National Laboratory system and consists of a plastic insert upon which are mounted gold, cadmium-covered gold, indium, and sulfur foils. When these materials are irradiated with neutrons, nuclear reactions occur and the foils become radioactive. The degree of induced radioactivity is a function of the energy and intensity of the neutron irradiation since each foil responds to a different neutron energy threshold... (From new brochure, Controls for Radiation, Inc., 130 Alewife Brook Parkway, Cambridge 40, Mass.)

FOR THIS LITERATURE CIRCLE 183 ON READER-SERVICE CARD

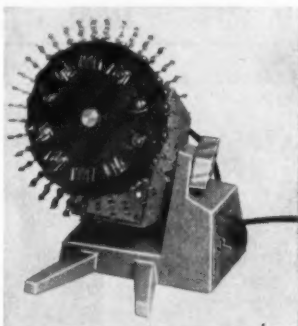
## MEASURING BLOOD FLOW



The Rheograph measures and records fluctuations in blood flow by measuring fluctuations of electrical conductivity within an area determined by electrode location. It is used with ECG apparatus having input resistance of 0.3 Megohm min. Rheograms localize arterial flow interruptions, indicate intercranial blood circulation and organic alterations of blood vessels, allow measuring heart contraction and ejection phases.—Schick X-Ray Co., Inc., 444 N. Lake Shore Dr., Chicago 11, Ill.

CIRCLE 184 ON READER-SERVICE CARD

## MULTI-PURPOSE ROTATOR

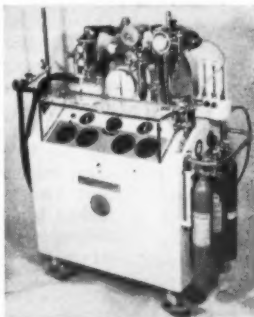


New Multi-Purpose Rotator handles laboratory mixing and agitation operations: solutions and blood, oxygen saturation of blood, blood ammonia and other micro-diffusion tests; tissue culture, washing of precipitates, semi-micro solvent extractions. Special shaker head accurately shakes blood pipettes used in blood counts. Eleven interchangeable heads with flexible spring clips hold 18 to 40 test tubes, centrifuge tubes, vials, small flasks, syringes or bottles from 8-20 mm in diameter.—Scientific Industries, 220-05 97th Ave., Queens Village, N. Y.

CIRCLE 185 ON READER-SERVICE CARD

## RESPIRATOR

The Engstrom Respirator automatically adjusts actual pressure necessary to inflate lungs and automatically varies rate of gas flow during in-

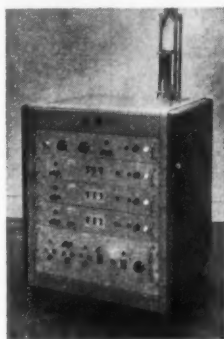


spiration according to varying resistance and compliance in airways and lungs; therefore it is able to administer preset ventilatory volume in unchanged quantity and with lowest possible pressure. Expiration time and the preset respiratory frequency are unchanged. Rate of gas flow does not start abruptly, but rises synchronously with pressure and is highest in presence of actual peak pressure. Three models are available: Model 200 Anaesthesia Respirator for controlled anaesthesia with rebreathing, partial rebreathing, non-rebreathing circuit and for prolonged respirator treatment; Model 150 Universal Respirator for prolonged respirator treatment and anaesthesia with non-rebreathing circuit; Model 100 Respirator for prolonged respirator treatment.—Schick X-Ray Co., Inc., 444 N. Lake Shore Dr., Chicago, Ill.

CIRCLE 186 ON READER-SERVICE CARD

## DYE INJECTION SYSTEM

New Dye Injection System, high-pressure injector with transistorized controls for use with all types of dyes, is particularly useful for injection of



radio-opaque dyes. Electronic controls allow injection at any specified time in cardiac cycle with particular heart beat or with successive heart beats. Equipment can control X-ray equipment, film changers, etc.—Enesco, Inc., 3100 Eldredge St., Salt Lake City 15, Utah.

CIRCLE 187 ON READER-SERVICE CARD

## SURGEON'S CAMERA

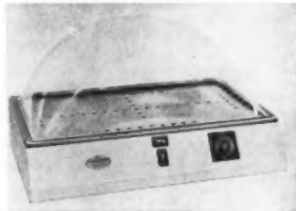
New VDR-1625 16-mm photographic recorder allows surgeon to take his own pictures. Camera, mount, lens and film weigh 2 lb. Camera



mounts on surgeon's head, is electrically driven from a 110-v source, is operated by foot switch, takes 25' of film (total of 1000 pictures) at 16 frames/sec or in still shots.—Vought Camera Co., 8907 Melrose Ave., Los Angeles 69, Calif.

CIRCLE 188 ON READER-SERVICE CARD

## VISIDOME INCUBATOR



New Portable VisiDome Incubator features clear plastic domed cover for complete visibility, eliminates need to open doors and disturb specimens. Uncomplicated, functional design eliminates corners and crevices; tray can be sterilized.—Emil Greiner Co., 20-26 N. Moore St., New York 13, N. Y.

CIRCLE 189 ON READER-SERVICE CARD

## NUCLEAR PARTICLE DETECTOR

New unique Guard Ring Detector for detection of charged particles in or out of a vacuum has millimicrosecond response and linearity of pulse



height with particle energy over wide range. Surface current leakage at junction edge is eliminated, resulting in high energy resolution. Type NPSG-25 operates from 25 to 75 volts for general use; NPSG-75, premium device for nuclear particle spectroscopy, operates from 75 to 200 volts.—Solid State Radiations, Inc., 2261 S. Carmelina, Los Angeles 64, Calif.

CIRCLE 190 ON READER-SERVICE CARD

## ELECTROSTATIC PRECIPITATOR

New Model 401 Microaire portable electrostatic precipitator, maximum efficiency unit for scrubbing air free of airborne allergens, bacteria and



virus particles, assists in reduction of re-infection and cross infection in hospitals. Is rated to move maximum capacity of 200 cu ft/min.—Microaire Div., Precipitator Corp. of America, 299 Marginal St., Boston 28, Mass.

CIRCLE 191 ON READER-SERVICE CARD

## OSCILLOGRAPHIC RECORDER

New Model 296T Oscillographic Recording System provides two channels of inkless, instantaneous heated stylus rectangular coordinate recording on



50-mm channels; uses interchangeable, plug-in preamplifiers to record ECG, EEG, pressures, temperatures, myograms, pneumograms, etc. Chart speeds of 2.5, 5, 25 and 50 mm/sec; synchronous paper drive motor may be turned on and off remotely.—Medical Div., Sanborn Co., 175 Wyman St., Waltham 54, Mass.

CIRCLE 192 ON READER-SERVICE CARD

## PORTABLE RECORDERS

New brief-case-size Model 299 general-purpose and Model 301 Carrier type d-c Recorders operate at 2.5 or 25 mm/sec chart speeds, provide im-



mediate traces on one-channel 40-division rectangular charts. Model 301 has basic sensitivity of 10  $\mu$ V rms per division, can be used for recording physiologic pressures and temperatures. Model 299 (shown) records output of Waters Nitrogen Meter and Liston Becker CO<sub>2</sub> Analyzer for gas analysis, and Colson Densitometer for dye dilution curves, etc.—Medical Div., Sanborn Co., 175 Wyman St., Waltham 54, Mass.

CIRCLE 193 ON READER-SERVICE CARD

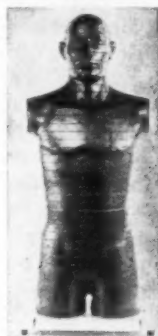
## GAS CHROMATOGRAPH

New Model 61C accepts all detection systems and all standard columns plus the new 1/8" columns. The unit can be adapted to other investigations conveniently and at minimum expense. Argon or hydrogen flame ionization detection or sensitive 4-wire thermal conductivity detection accessories interchange in a few minutes without special tools. Accuracy: linear input splitter with ratios from 100:1 continuously variable up to 700:1. The Argon detector cell is the new 1-cm design, giving optimum volume to sensitivity ratio. Sensitivity with capillary columns is to 10<sup>-13</sup> mol. Hydrogen Flame Ionization detector has been improved; with capillary columns the flame detector detects as little as 10<sup>-13</sup> mol.—Barber-Colman Co., Industrial Instruments Div., Rockford, Ill.

CIRCLE 194 ON READER-SERVICE CARD



## RADIATION THERAPY PHANTOM

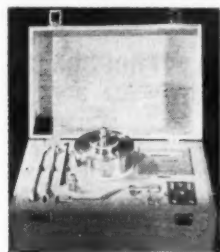


New RANDO (Radiation Analog Dosimetry) phantom, constructed of a human skeleton around which is molded special plastic material that absorbs radiation in the same way as does human soft tissue, makes radiation treatments more accurate. Lungs and other air passages are molded in place. The manikin is sliced into 35 segments, each about 1" thick, to provide access to the recording instruments.—Alderson Research Laboratories, Inc., 48-14 33rd St., Long Island City 1, N. Y.

CIRCLE 195 ON READER-SERVICE CARD

## HIGH-PRESSURE FILTER

New ARAFLO 65 ultrafiltration apparatus permits rapid deproteinization of plasma and removal of colloids from colloidal solutions by high pres-

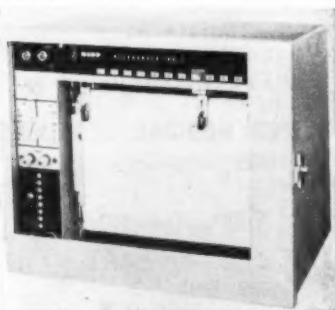


sure filtration (to 500 psig) through supported cellophane or other membranes. Filter pads and membranes for several applications are available.—Applied Research Associates, 403 E. 70 St., New York 21, N. Y.

CIRCLE 196 ON READER-SERVICE CARD

## DC RECORDING MICROVOLT-MICROAMMETER

New Kipp Micrograph BD Series, high speed d-c recording microvolt-microammeter features 12 measuring ranges, full-scale (100 scale divi-

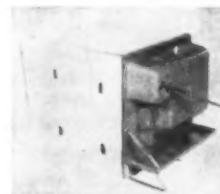


sions) deflection of 21 cm, = accuracy within 1% of full-scale deflection, full-scale travel within 1 second. Units have interchangeable gears for chart speed from 72 to 69,120 mm/h with 60-cps supply, depending on model.—Biotronics Laboratories, Box 744, Station B, Montreal, P.Q., Canada.

CIRCLE 197 ON READER-SERVICE CARD

## ICE-COOLED CROUP TENT

New ice-cooled Croup Tent provides variable humidity conditions and serves as an aerosol and oxygen therapy tent for adults or children.



A sleeve seals it comfortably around patient. It is transparent on four sides.—NCG Div., Chemetron Corp., 840 N. Michigan Ave., Chicago 11, Ill.

CIRCLE 198 ON READER-SERVICE CARD

## AUDIOMETER

New Audiometer has frequency range of 125 to 800 cps, decibel range of 10 to 100 db. Detects hearing deficiencies within 8 min. Applicable for use in hearing tests, employment physical exam, etc.—Universal Electronics Labs. Corp., Hackensack, N. J.

CIRCLE 199 ON READER-SERVICE CARD

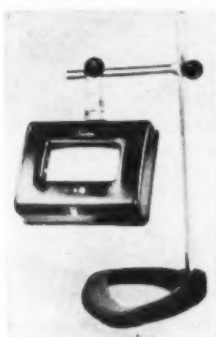
## FREEZER FOR BIOLOGICAL SPECIMENS



New BF-1 Freezer, for use with standard liquid nitrogen refrigerators, provides a compact, low-cost freezing system suitable for most types of biological specimens. A low-cost, liquid nitrogen freezer, the BF-1 freezes 504 ampules of bull semen in about 40 minutes. Cooling rate permits successful freeze-preservation of biological materials. After the freezing cycle is completed, the refrigerator is filled with liquid nitrogen—placing the frozen semen in storage until needed. A buzzer then sounds indicating completion of the entire operation, and the BF-1 is automatically turned off.—Linde Co., Div. Union Carbide Corp., 270 Park Ave., New York 17, N. Y.

CIRCLE 200 ON READER-SERVICE CARD

## MAGNIFIER LIGHTS



New Inspection Lights, which are also 3-power magnifiers, combine soft fluorescent illumination with centered, precision-ground magnifiers. Model 1931 has handle for portability; Model 1927 has 16" stand and 6" horizontal arm; Model 1932-10 has clamp-on Fleximatic arm which gives all-around adjustability within 4' radius; Model 1925 is floor model which has floating arm that can be raised up to 6' above floor.—Burton Medic-Quipment Div., Burton Mfg. Co., 1918 E. Imperial Hwy., El Segundo, Calif.

CIRCLE 201 ON READER-SERVICE CARD

## FLAME PHOTOMETER

New Model H Clinical Flame Photometer uses internal standard double beam principle wherein known amount of lithium is added to all solu-



tions being analyzed. Atomized solutions are excited by flame and emit characteristic flame spectra of Na, K, and Li with light intensities proportional to concentrations. Respective light intensities are determined by three photoconductive cells. Single dilution of blood serum or urine with lithium solution is only preparation required to determine Na and K content. Reproducibility is  $\pm 1/4$  division; accuracy  $\pm 1\%$  of full scale or better.—Process & Instruments Corp., 15 Stone Ave., Brooklyn 33, N. Y.

CIRCLE 202 ON READER-SERVICE CARD

## PHYSIOLOGICAL TELEMETRY

New MIDAS (Miniature Data Acquisition System) real-time FM/FM, multi-channel Telemetry System senses and transmits respiration rate, heartbeat, pressure, strain, acceleration, etc.—Unilectron, Inc., 129 Binney St., Cambridge 42, Mass.

CIRCLE 203 ON READER-SERVICE CARD

## MEDTRONIC medical electronic instruments



## CONDUCTION SYSTEM LOCATOR

The chance of surgically induced heart block, long a problem in open heart surgery, is now minimized—if not eliminated—by the proper use of the Medtronic Conduction System Locator. Featuring a specially designed electronic depth probe, this instrument is used to "trace" the cardiac conduction system with an accuracy of one millimeter. As the probe is moved over the ventricular septum, an audible tone changes pitch as the conduction system is passed over. A pronounced rise in pitch indicates the Bundle of His.



## CARDIAC SENTINEL

Connected by heart wires or chest electrodes, the Sentinel monitors the ventricular "R" wave. If the heart arrests, or if it blocks below the rate set on the front panel, the Sentinel automatically triggers ventricular systole at a preset rate. Extremely reliable, it does not call "wolf" when no emergency exists, nor does it fail to react when a true crisis is present. Not confused by spurious signals, it cannot mistake its own pulse for an "R" wave. The transistor circuit is operated by its own self-contained power source, completely removing the hazards associated with AC powered equipment.



## ELECTRO-COAGULATION GENERATOR

Pick up bleeder—gently squeeze forceps—cauterize only the bleeder. The Medtronic Electro-Coagulation Generator works with the well-known Medtronic Electro-Coagulation Forceps (the insulated forceps with switch in the handle to energize the cautery unit). In addition to working as a standard cautery with forcep control, the unit provides bipolar power for Medtronic's new Bipolar Forceps. In the bipolar mode of operation, the cautery unit automatically stops when the bleeder between the forcep tips is dry. The unit may be switched to unipolar mode of operation at any moment by pressing the foot switch; for example, if one wishes to cauterize a bleeder through a previously clamped hemostat.



## IMPLANTABLE PACEMAKER

The Chardack-Greatbatch Implantable Pacemaker is designed for the long-term treatment of complete heart block. Its unique transistor circuit, small physical size, and long battery life (3 years) makes subcutaneous implantation both practical and justifiable. Each individual component, including batteries is held firmly in place and potted with epoxy resin, which eliminates motion between components, breakage of wires, and shorting in the circuit due to seepage of body fluids. The entire unit is totally encapsulated in a second thin wall of Dow-Corning Silastic.

MEDTRONIC INSTRUMENTS

ARE AVAILABLE THROUGHOUT THE WORLD

UNITED STATES  
independent representatives  
ALL FOREIGN COUNTRIES  
Picker International Corp.  
CANADA  
Biotronics Laboratories



MEDTRONIC, INC.

3055 HIGHWAY 8 MINNEAPOLIS 18, MINNESOTA  
TWX-MP208 STerling 1-2718

CIRCLE 19 ON READER-SERVICE CARD

## RECORDING BALANCES ANALYTICAL &amp; SEMI-MICRO

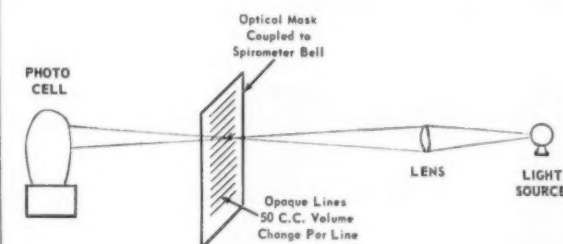


New Analytical and Semi-Micro Balances in one- and two-pen models combine the range and accuracy of the analytical balance with a continuous record and automatic operation. They show both instantaneous weight and rate of change. Weight changes occurring while the sample is in the balance or suspended outside the balance in an oven, furnace, special atmosphere, or other controlled environment can be recorded continuously for short or long periods. Uses include thermogravimetric analysis, studies of evaporation, oxidation, sublimation, decomposition, absorption, sedimentation, or simply drying. Other recording balances are available in analytical and semi-micro models for weighing in vacuum or in pressure.—Wm. Ainsworth & Sons, Inc., 2151 Lawrence St., Denver 5, Colorado.

CIRCLE 204 ON READER-SERVICE CARD

## Computing Spirometer

An advanced spirometer development adapts new digital computer techniques to the problems of pulmonary function testing. Provides instantaneous and accurate



evaluations of Maximum Breathing Capacity, Vital Capacity, and Timed Vital Capacity without the expense, inconvenience, and time consuming interpretation of records.

Negligible flow resistance combined with extremely low moment of inertia make the unit well suited to the rapid flows encountered in the MBC test. The accurate and high speed volume totalizer presents the MBC directly in liters/minute the instant the test is completed. Tests are accurately timed by an internal timer which operates automatically.

A Krogh type spirometer of special construction utilizing anti-friction bearings and a non-contacting optical-electronic pickup unit is the basic element of the system. Movement of the spirometer bell is converted into electrical pulses by a mask containing opaque lines spaced to intercept a light beam each time the bell moves the equivalent of 50 milliliters volume. The interrupted light beam strikes a photo cell and produces the electrical pulses previously referred to. The pulses are counted by an electronic and electro-mechanical counter to give the total volume change during a timed interval. . . (From new bulletin, Gilford Instrument Labs., Inc., Oberlin, Ohio.)

FOR THIS LITERATURE CIRCLE 205 ON READER-SERVICE CARD



## FRESH TISSUE TO FINISHED SLIDE IN 3 MINUTES

New Microtome Cryostat by International Equipment Co.



Rapid development of frozen sectioning as the preferred technique has led to the wide acceptance of the International-Harris Microtome-Cryostat Model CT, representing a significant advance in tissue sectioning. This new unit, developed through consultation with practicing pathologists provides the pathologist or histologist with a rapid and easy means of preparing large or small, thin, unwrinkled sections of single or multiple pieces of fresh frozen tissue. These sections have the high resolution of cytologic detail required for definitive pathologic diagnosis, histochemistry, fluorescent microscopy, and autoradiography. One outstanding advantage of this combination is found in surgical pathology. The complete operation from fresh tissue to finished slide ready for examination can be completed in as little as three minutes. Laboratory personnel may now cut quality frozen sections as thin as 2 microns.

Everything necessary for precise, frozen sectioning has been conveniently packaged in this superbly engineered, compact instrument. There is a new integral Freon fast freezing arrangement. Controlled temperatures from  $-10^{\circ}\text{C}$  to  $-20^{\circ}\text{C}$  are held — even with the top open. The instrument enables laboratories to significantly speed their service. Pathologists get the best possible sections to help achieve diagnostic certainty even when under pressure of time.

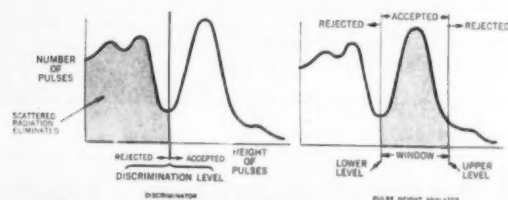
Write for brochure and handbook.

INTERNATIONAL EQUIPMENT COMPANY  
1284 Soldiers Field Road Boston 35, Massachusetts

CIRCLE 20 ON READER-SERVICE CARD

## Collimators for Optimal Scanning

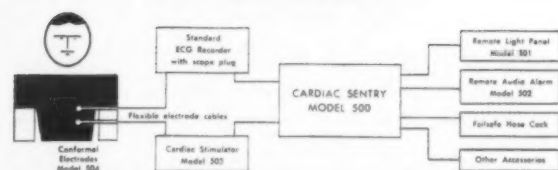
For optimal scanning, the Ultraprobe (scintillation detector) must be equipped with a focussing collimator so that the large crystal will "see" only a small body area. The design of any focussing collimator necessarily repre-



sents a compromise between efficiency and definition (or resolving power) . . . The 2102 Fine Focus Collimator has 31 holes. Under optimum conditions it can resolve an object as small as a 0.5 cm diameter sphere. It is recommended for use on the thyroid or other small organs possessing good differential uptake. The 2107 Coarse Focus Collimator has 19 holes and can, under equivalent conditions, resolve an object twice the diameter of the resolving capability of the Fine Focus Collimator. However, it is about six times as efficient as the Fine Focus Collimator. It is recommended for scanning large organs in which abnormalities may have a differential uptake as small as 10%, but where it is not necessary to delineate very small areas (e.g., brain tumors) . . . (From 8-page Bulletin N-5261, Picker X-Ray Corp., White Plains, N. Y.)

FOR THIS LITERATURE CIRCLE 206 ON READER-SERVICE CARD

## ECG Monitor



The Cardiac Sentry continuously monitors a patient's pulse rate and shape of the QRS complex with respect to set-in limits prescribed by the attending physician for Tachycardia, Bradycardia, Arrest, and QRS Duration. When any of these preset limits is exceeded, a distinctive warning light is illuminated, a remote audio warning is sounded (optional), the ECG recorder is activated for 15 seconds, prescribed medication can be initiated and controlled without the presence of a physician, and a cardiac stimulator can be automatically actuated in the Arrest condition. The visual and audio alarms continue until the pulse rate returns within the prescribed limits, or an attendant resets or disconnects the Sentry . . . Accessories include a Cardiac Stimulator, a Remote Light Panel, and a Remote Audio Alarm . . . (From 3-page bulletin, Special Products Div., Melpar, Inc., Subs. Westinghouse Air Brake Co., 3000 Arlington Blvd., Falls Church, Va.)

FOR THIS LITERATURE CIRCLE 207 ON READER-SERVICE CARD

## Ultraviolet Monitor

The Buchler Uviscan makes possible the detection of U.V. absorbing compounds in the eluates from all types of chromatographic systems, including ion exchange, absorption and partition columns. The instrument par-



ticularly lends itself to use with partition systems, because the high sensitivity and use of relatively short light paths allow the use of the full range of organic solvents including those which absorb in the ultraviolet region.

Some of the compounds which have been detected with the Uviscan include Proteins (280 nm), Steroids (240, 280 nm) and Nucleosides or Nucleotides (260 nm). As little as 10 micrograms of the common nucleosides such as Adenosine, Guanosine, Uridine etc. have been easily detected in the effluent from liquid partition chromatographic columns . . . Proteins, of course, present a more difficult problem, since their inherent absorption is much lower on a weight basis. However, solutions with optical densities in the range of 0.4 can be detected easily . . . (From new bulletin, Buchler Instruments, Inc., 514 W. 147 St., New York 31, N. Y.)

FOR THIS LITERATURE CIRCLE 208 ON READER-SERVICE CARD

## ELECTRICALLY HEATED DISPENSER



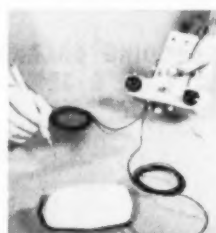
New electrical-ly heated B.O.V. Dispenser for dispensing pharmaceuticals or materials which involve rigid sanitary requirements is available in 4-qt (150° to 550°F) through 25-gal (250° to 550°F) sizes. Heat is uniformly applied to bot-

tom and 75% of sidewall by multiple circuit heating element, assuring uniform temperature throughout. Dispenser has motor agitator, ¾" bottom-operated valve, variable dial thermostats. Bulletin D3.—Sta-Warm Electric Co., Ravenna, Ohio.

CIRCLE 210 ON READER-SERVICE CARD

## PHYSIOLOGICAL STIMULATOR

New 14-oz battery-operated portable Stimulator has been successfully used during surgical procedures involving ulnar transplants and pec-

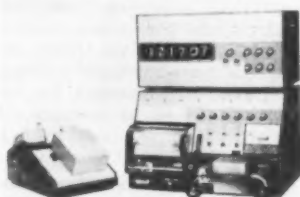


toralis major transplants. Sterilizable unit has complete controllable voltage adjustments which allow surgeon to gage exactly amount of stimulation to individually exposed nerves during surgical procedure where such stimulation is necessary or desirable. —Theratron Corp., 263 Griggs-Midway Bldg., St. Paul 4, Minn.

CIRCLE 211 ON READER-SERVICE CARD

## CHROMATOGRAM SCANNER

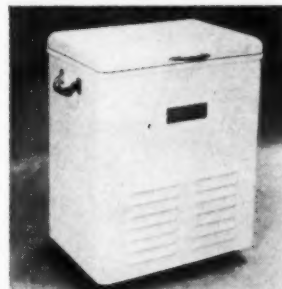
New Model 880ADS Autoscaner with Automatic Data System eliminates need for mechanical integration, planimetry and triangulation. Featur-



ing automatic direct quantitative digital presentation of radioactive zones, instrument allows programming to present various parameters of entire scan, eliminating unwanted data, and allows combining of several data presentation functions in one operation. —Vanguard Instrument Co., Box 244, LaGrange, Ill.

CIRCLE 212 ON READER-SERVICE CARD

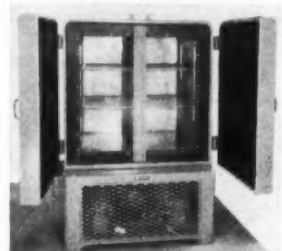
## MINIATURE ENVIRONMENTAL CHAMBER



New 0.5 cu ft Penguin/5 environmental chamber for medical research and pharmaceutical/biological storage requires less than 2½ sq ft of floor space, is caster mounted. Standard low temperature range is from  $-10^{\circ}$  to  $-60^{\circ}\text{F}$ . —Cincinnati Sub Zero Products, 3930 Reading Rd., Cincinnati 29, Ohio.

CIRCLE 213 ON READER-SERVICE CARD

## LOW TEMPERATURE STORAGE CHAMBERS



New low-temperature cabinets for storage of medical or pharmaceutical biologicals are available in a wide range of sizes and styles. The 18 cu ft upright chamber (illustrated) is made of 302-2B Stainless Steel and is liquid tight. Temperature adjusts to  $-100^{\circ}\text{F}$ . Contents are protected by a battery-operated buzzer alarm system which signals a warm-up due to power failure or any other cause. The chamber is 36" high x 36" wide and 24" deep, has stainless steel adjustable shelves and two full opening doors. The cabinet (70" x 46" x 34") is moisture free. —Cincinnati Sub Zero Products, 3930 Reading Rd., Cincinnati 29, Ohio.

CIRCLE 214 ON READER-SERVICE CARD

## INTERVAL TIMING

New Pedichron with electrical foot switch operates any standard stop watch having top stem control. Stop watch is held by rubber-covered circular steel spring; solenoid switch activates adjustable arm which presses watch stem.

New automatic reset, numerical readout Autochron indicates elapsed time up to 9999.9 sec, in 1/10 sec, in clear numerals on sloping face plate. On-off bar starts or stops timer. —Clay-Adams, Inc., 141 E. 25 St., New York 10, N. Y.

CIRCLE 215 ON READER-SERVICE CARD

## Vacuum and Pressure Control

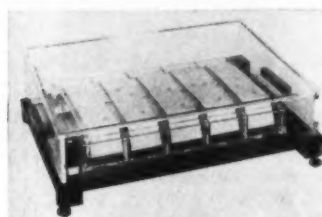


The active part of the Manostat consists of an inverted cylindrical tube with a closed top floating in mercury contained in a closed cylindrical tube. The float, called the Cartesian diver, . . . traps a fixed quantity of gas underneath, which serves as the controlling pressure. Interior and concentric to the Cartesian diver is a hollow central tube through which the fixed quantity of gas is introduced into the diver. Communicating with this central tube is a bushing which facilitates connection with external tabulations. At the top of this central tube is a memory orifice which is closed off by a rubber seat on the inside of the Cartesian diver, when the diver falls to its lowest position . . . A rubber seat on the top of the diver closes off a movable orifice, when the diver rises due to a differential decrease in pressure on the outside of the diver. The orifice can be moved in a vertical direction by virtue of being connected to an orifice tube containing a screw which can be rotated by a handle; the position of the tube can be fixed by a lock nut . . . (From 16-page booklet, Emil Greiner Co., 20-26 N. Moore St., New York 13, N. Y.)

FOR THIS LITERATURE CIRCLE 209 ON READER-SERVICE CARD

## ELECTROPHORESIS

New rapid, low voltage Electrophoresis Instrument uses special multiple organic buffers and provides visual observation by means of tracer



dyes; combines new developments in paper electrophoresis instrumentation which simplify ionophoretic separations and identification. Penta-cell construction of buffer chambers permits simultaneous use of up to five buffers with pH of 3.3, 4.0, 4.7, 5.9, 7.2, 8.0 and 9.3; low voltage gradient eliminates need for cooling during electrophoresis. —Kensington Scientific Corp., 1717 Fifth St., Berkeley 10, Calif.

CIRCLE 216 ON READER-SERVICE CARD

## FILMED MEDICAL LECTURES

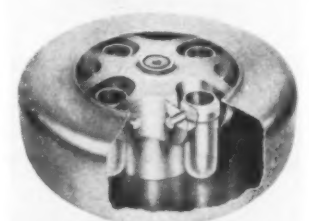


New Illustrated Medical Lectures series of graduate course in medicine (offered by Loma Linda University, School of Medicine) consists of 30-minute audio tape and color 35mm filmstrip. They allow doctors to continue medical education at home. Lectures are available singly, by subscription, and on a lease plan. —Film Distributors International, 2223 S. Olive St., Los Angeles 7, Calif.

CIRCLE 217 ON READER-SERVICE CARD

## CENTRIFUGE ROTOR

New titanium-stainless steel HB-4 large capacity horizontal rotor has four 50-ml swinging buckets; is corrosion resistant, lightweight, strong,



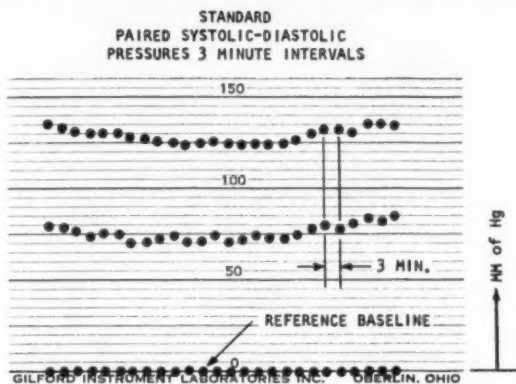
and easy to clean; accepts all tubes (except No. 517 F stainless steel tube) and adapters used in standard SS-34 Superspeed Rotor. HB-4 is ideal for use in obtaining zonal and density gradient separations. —Ivan Sorvall, Inc., Norwalk, Conn.

CIRCLE 218 ON READER-SERVICE CARD



## Blood Pressure Recorder

The Model 110 Automatic Blood Pressure Recorder uses the principles of sphygmomanometry to record blood pressure without the need for arterial puncture. The in-



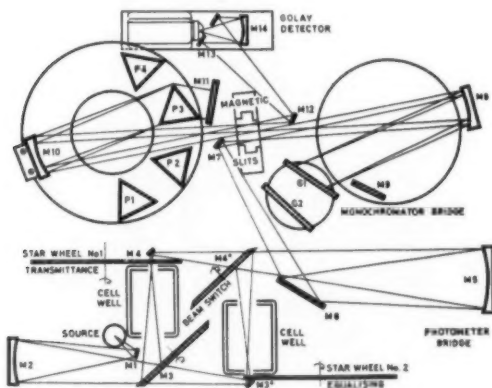
strument follows the same procedure as in manual measurement but does it automatically and without supervision.

A small air compressor inflates the arm cuff periodically as a sensitive microphone and electronic circuit listen for the arterial sounds. The instrument recognizes and responds when the cuff pressure corresponds to systolic and diastolic values and records these pressures on a chart. Such recordings may be made as often as every 60 seconds. Dynamic changes of systolic or diastolic levels can also be followed at 5-second intervals . . . Simple controls adjust the recorder to the subject, and the instrument then measures and records the pressures directly on the chart at the desired time interval. There is no discomfort to the subject and circulation is restricted for only the brief periods of the measurement. Safety devices prevent excessive or prolonged pressure from being applied in the event of malfunction . . . (From new brochure, Gilford Instrument Labs., Inc., Oberlin, Ohio.)

FOR THIS LITERATURE CIRCLE 219 ON READER-SERVICE CARD

## Diffraction Grating Spectrometer

The development in recent years of high quality diffraction gratings has made possible considerable advances in infrared spectroscopy. Appreciably higher dispersions and therefore better resolving powers are obtainable than with conventional prism materials (LiF, CaF<sub>2</sub>, NaCl), and the narrow bandwidth of a prism/grating double monochromator reduces stray light to a minimum. Resolving powers of this order are particularly valuable for analysis of gases, or substances with sharp absorption bands . . .



Radiation enters the grating monochromator through a curved entrance slit, is dispersed, and enters the prism monochromator through a wide intermediate slit. Radiation from the prism leaves through a straight exit slit, and is condensed on to a Golay detector by means of a Pfund condensing system, giving a demagnification of 5:1. The curvature of the entrance slit compensates for image curvature introduced by the prism monochromator . . . (From new brochure, J. C. O'Connell Co., Box 362, New Canaan, Conn.)

FOR THIS LITERATURE CIRCLE 220 ON READER-SERVICE CARD

## Battery-less Endoradiosonde

TOKYO, JAPAN—Nippon Electric Co., Ltd., will soon produce a commercial version of a battery-less endoradiosonde, the "Echo Capsule," that measures temperature, acidity and pressure in the human stomach. The unit comprises a Hartley oscillator and an external pulsed high-frequency power supply.

## SCINTILLATION DETECTORS



New large-well Scintillation Detectors (4 models, well diameter to 10", volume to 20 liters) permit whole-body counting of animals or other large liquid or solid radioactive samples. Counting efficiency and reproducible geometry allow efficient counting even with 0.01-microcurie injections. Plastic scintillation phosphors are machined from single large ingots and coated with metallic oxide reflector to assure maximum optical performance.

CIRCLE 221 ON READER-SERVICE CARD

## DC TO AC INVERTERS



New ATR Inverters plug into car cigarette lighter or connect directly to storage battery and change 6 or 12 volt automobile or marine battery current into 110 volts alternating house current. Mighty Midget Model DME and Medium Power Portable Plug-in Model RME are for use with dictating machines, record players, and similar low wattage devices; Universal Inverter Model RHG handles tape recorders, small TV sets, PA systems, etc. Inverters also provide a power source for emergency lighting, civil defense, Red Cross work, rescue work. —American Television & Radio Co., St. Paul 1, Minn.

CIRCLE 222 ON READER-SERVICE CARD

## PORTABLE FETAL ECG



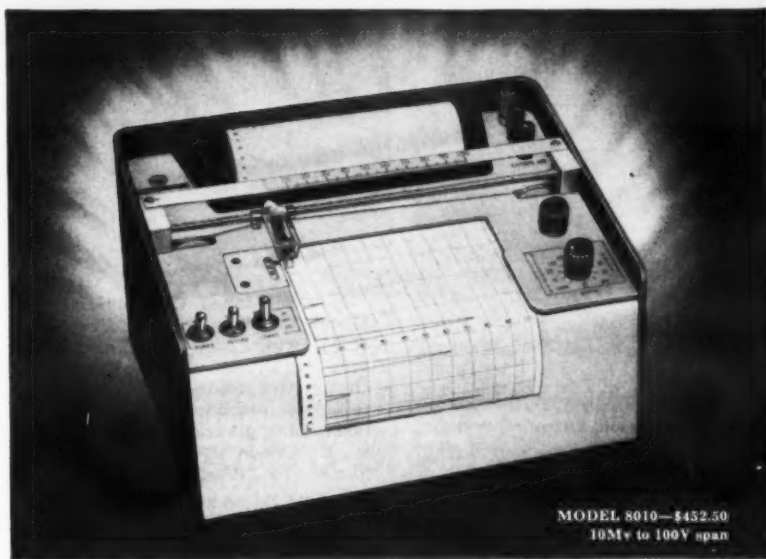
New Model IL-111 portable Fetal Electrocardiograph detects fetal life "where fetal heart sounds could not previously be heard"—fetal distress during labor, early diagnosis of fetal death in utero, multiple pregnancy. It can be used for interpretation of fetal wave forms and for other clinical and research applications. Clarity of recordings results from specially designed "five-step" filtering system which distinguishes and instantaneously records both fetal and maternal QRS complexes. Other features include portability, simplicity of operation, two-speed recorder, hot stylus, treated paper, standard "cup" electrodes and elimination of elaborate skin preparation. —Instrumentation Laboratory, Inc., 108 Cummington St., Boston 15, Mass.

CIRCLE 223 ON READER-SERVICE CARD

## GAS INJECTION DEVICE

New automatic and self-contained device injects gaseous material into a larger gas system at a constant ratio in the part per million range, requires no power source other than that supplied by pressures in the main line. The adjustable injection ratio is maintained regardless of pressure, temperature, or flow variations in the main stream. —Isotopes, Inc., 123 Woodland Ave., Westwood, N. J.

CIRCLE 224 ON READER-SERVICE CARD



## POTENTIOMETRIC

# Graphicorders®

HIGH ACCURACY— $\frac{1}{2}\%$  of span

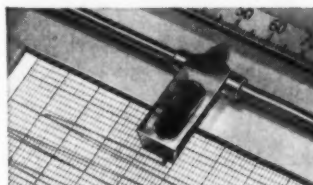
FAST RESPONSE TIME— $\frac{1}{2}$  sec. full scale

HIGH SENSITIVITY— $\frac{1}{4}\%$  of span

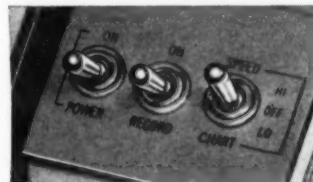
Zener diode reference system • Two chart speeds

**\$380<sup>00</sup>**

MODEL 8000



Transparent capillary pen with large ink reservoir is easily aligned, cleaned, filled or removed.



Selection of two chart speeds is made with fingertip control. No motor or gear changes are necessary.

The newest in electronic circuitry. Compactly designed for reliable, accurate, rectilinear recording. Zero drift negligible due to null-balance, chopper-stabilized, servo-type potentiometric system. When coupled with proper sensing elements it records input variables such as heat, solution conductivity, pressure, temperature, etc.

## SIX MODELS TO CHOOSE FROM

(Models 8020 and 8021 are specifically designed for gas chromatography.)

Dynatronic Graphicorders are the finest, yet lowest price recording instruments available, today. There is no need to pay more . . . no need to settle for less!

Write today for specifications and name of your nearest authorized dealer



**DYNATRONIC  
INSTRUMENTS CORP.**

3070-82 WEST GRAND AVE., CHICAGO 22, ILL.

ELECTRONICS DIVISION OF LABLINE, INC.

CIRCLE 21 ON READER-SERVICE CARD

## RADIATION DETECTOR



New Model B86B1 Electromagnetic Radiation Detector weighs less than 2 lb, can be hand-carried or will stand and operate unsupported. It operates with one knob without frequency-range switching (over frequency range from 400 to 10,000 mc), has single integral antenna, and utilizes standard, large-capacity mercury batteries. Unit responds to all planes of polarization: linear, left- and right-hand circular, random, pulsed or continuous wave. All incident energy is integrated and total field is read on meter, eliminating need for summing series of measurements at number of frequencies and modes of polarization. —Sperry Microwave Electronics Co., Clearwater, Fla.

CIRCLE 225 ON READER-SERVICE CARD



## PORTABLE LIGHT BOX

Saves time and space

1-7/16" thin, of light-weight, modern construction; when supplied with a straight edge or drafting machine, as shown, unit becomes a self-contained drafter.

Use on drafting board, bench or desk. Diffusers on fluorescent lamps give strong yet glare-free lighting of work. Permits tracing of light lines or curves, or comparison of two or more superimposed layouts or details to spotlight interferences and errors. Other uses:

- Inspection of thin boards and materials for cracks or defects
- Viewing of X-rays or negatives
- Display of signs, educational matter, transparencies (built-in easel available)
- Art Work: tracing on Bristol board, Multilith or Mimeo mats, or stripping-in and opaquing negatives

Light weight and thin design encourage use on regular drafting board, permit unit to be stored with reference books, ready for next user. It pays for itself in a short time.

CONSTRUCTION: Stainless steel frame; shatterproof acrylic diffuser top (with protective glass cover when used with razor blades); built-in switch; rubber feet; available in 5 standard sizes up to 36" x 48", starting at \$32.50. Send for FREE literature — no salesman will call.

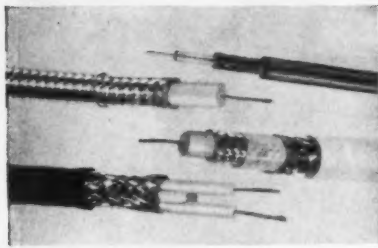
**PORTA-TRACE INC.**

50 Wall St., Binghamton, N.Y.

CIRCLE 22 ON READER-SERVICE CARD

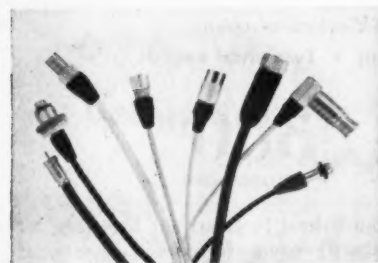


## Microminiature Coaxial Cables



Important designed-in characteristics of this coaxial cable line are low-noise, low capacitance and high operating temperatures. Available in coax, twinax and triax constructions, these microminiature cables meet MIL-C-17C requirements and yield the same matched impedance required for larger systems. Standard cables have 50, 75 and 90 ohms impedance ratings while special designs are available ranging from 30 ohms to 160 ohms.

## Microminiature Coaxial Connectors



Microdot's microminiature connectors—including the world's smallest 50-ohm coax connectors—are available in over one million combinations. Plugs are available in straight or angle screw types and slide-on versions. Receptacles include printed circuit and bulk-head feed-thru types. Only highest quality materials are used. Conductors are of silver-plated copperweld or cadmium bronze, center contacts are of gold-plated coin silver. Housings are silver-plated brass to assure minimum electrolysis with aluminum panels. "Teflon," "Kel-F," polyethylene, and neoprene are used as dielectrics, jackets, bend relief caps, and pin protectors.

### MICRODOT INC.



220 Pasadena Ave.  
South Pasadena, Calif.

CABLES—CIRCLE 51  
CONNECTORS—CIRCLE 23

## DRY TRANSFER LETTERING



instant lettering

Instant Lettering brings you the finest, most meticulous lettering in the world instantly—by instantaneous dry transfer from type sheet to any smooth surface. Just press and it's there. No trace of adhesive to sully artwork. Needs no equipment. Perfect on wood, paper, card, glass, metal, film . . . in fact any smooth surface. The right answer to the need for highest quality lettering for display panels, roughs, signs, labels, graphs, charts, TV cells.

10" x 15" SHEET ONLY \$1.50

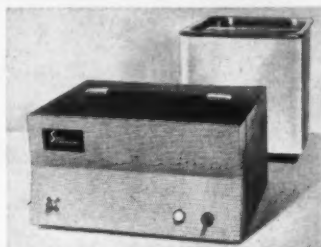


How it works:  
rub on letter with pencil . . . lift away sheet  
Send for sample and complete type chart

ARTHUR BROWN & BRO., Inc.  
2 W. 46th St., New York 36, N. Y.

CIRCLE 24 ON READER-SERVICE CARD

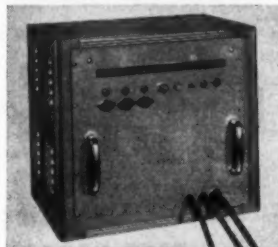
## ULTRASONIC CLEANER



New self-tuned Ultrasonic Cleaner Model MS 90 with power capability of 90 (Av) w, 300 w peak, contains a tube in a half-wave self-rectifying circuit. Generator works on scanning principle. Transducer ST 751 has full inside tank dimensions of 7 1/4" x 9 1/4" x 4".—Sonic Systems, Inc., 1250 Shames Dr., Westbury, N. Y.

CIRCLE 226 ON READER-SERVICE CARD

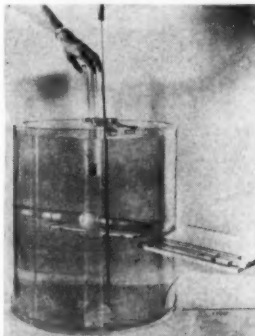
## ANODE-TUBE ROTOR



Hi-Rotor, new rotating X-ray anode-tube rotor-control equipment, supplies 120-cycle power source which allows 6000+ rpm rotor speeds, enabling use of finer focal spots and greater tube loadings by reducing peak focal spot temperature. Equipment can be used on existing X-ray installation or built into new installations.—Continental X-Ray Corp., 1536 N. Clybourn Ave., Chicago 10, Ill.

CIRCLE 227 ON READER-SERVICE CARD

## NEUTRON EXPERIMENTAL APPARATUS



New Neutron Howitzer, Visiflux 1100, handles Po-Be or Pu-Be sources up to 5 curies (sources available on loan without charge from U.S. Atomic Energy Commission for use by educational institutions) for research and education experiments in nuclear engineering, neutron physics and radiochemistry. Experimental arrangements are visible through main Plexiglas cylinder; detecting probes and foils may be positioned in three dimensions. Included with each Visiflux are a lab manual containing 23 experiments and 15 large training aid charts. Spec Sheets.—Radiation Equipment & Accessories Corp. (REAC), 665 Merrick Rd., Lynbrook, N. Y.

CIRCLE 228 ON READER-SERVICE CARD

## CHROMATOGRAM BOX



New molded plastic Chromatobox<sup>®</sup> developing chamber for full-length paper chromatograms up to 2" wide and 17 1/2" long is 3" x 3" x 1 1/2", supplements larger units. Paper chromatogram is rolled into strip of non-wettable embossed Teflon, results in 1"-dia coil, requires less than 10 cc of solvent for saturation of enclosed atmosphere and for complete development.—Research Specialties Co., 200 S. Garrard Blvd., Richmond, Calif.

CIRCLE 229 ON READER-SERVICE CARD

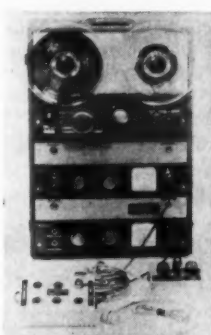
## DENSITY MEASURING DEVICE



New Densitor provides uniform and reproducible density determinations continuously in-stream, or by batch or sampling techniques; non-destructive measurement of chemicals, foods, drugs, etc.; operates in -65° to 200°F, -15 to 200 psi ranges within 10 msec; is not affected by attitude of sensor, flow velocity, viscosity.—Co-Engineering Co., Boonton, N. J.

CIRCLE 230 ON READER-SERVICE CARD

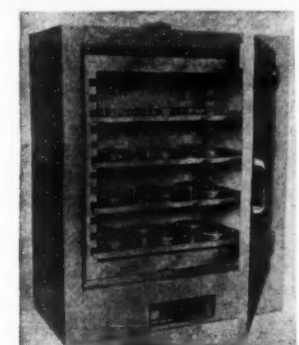
## AUDIO ANALGESIA



New Sonic-Thesia device for doctors' and dentists' offices includes Model 990S stereo tape machine, master distribution panel, cable, patient's control panel, under-the-chin stethoscope ear plug set, and patent-protected Sonic-Thesia tapes that play up to 3 hr. Unit serves up to six dental chairs with additional extension cables, patient controls and ear plug sets. Lap control box held by patient controls music level and masking sound level.—Roberts Electronics, Inc., 5920 Bowcroft Ave., Los Angeles 16, Calif.

CIRCLE 231 ON READER-SERVICE CARD

## INCUBATOR/EMBEDDING OVEN



New combination "Wall-Cab" Incubator and Embedding Oven is 12" deep x 24" wide x 30" high outside, hangs on wall or sits on adjustable supporting rods, keeps bench surface clear. Temp range is from slightly above ambient to 60°C; control tolerance is within ± 1/2°C. Enclosed radiation wall heating, blower, and built-in air ducts in walls maintain chamber gradient to 1°C or better. Bulletin 359.2.—Labline, Inc., 3070 W. Grand Ave., Chicago 22, Ill.

CIRCLE 232 ON READER-SERVICE CARD

## HI-V POWER SUPPLY

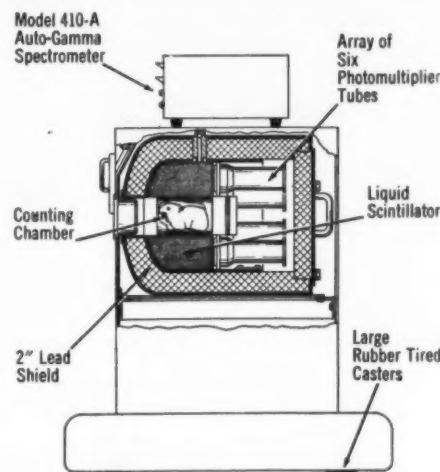


New RF-type, high-voltage Power Supply provides continuously variable d-c output voltages from 10 to 40 kv with high voltage limit control that sets upper voltage limit from 35 to 45 kv. Line regulation is better than 0.05%, load regulation 0.5%, ripple less than 0.5% with no visible corona in darkened room—none audible. Applications include insulation leakage tests, electrostatic spraying, electron gun spraying, deflection voltage for particle accelerators and electronic materials testing.—Mikros, Inc., Subs. Electro Scientific Industries, 7620 S. W. Macadam Ave., Portland 19, Ore.

CIRCLE 233 ON READER-SERVICE CARD

## Whole-Body Counting

Large liquid scintillation counters, being developed at the Los Alamos Scientific Laboratory of the University of California for the U.S. Atomic Energy Commission, have been shown to have many practical applications to diag-



nosis in clinical and experimental medicine. Several of these devices, called "human counters," for assaying radioactivity are large enough to measure the radiation coming from the whole human body after administration of minute amounts of a radioisotope . . . With a small model, known as the "arm counter," changes in the amount of circulating radioactive substances can be measured so accurately and rapidly that blood clearance studies can be performed easily, allowing measurement of many hepatic, renal, splenic, and bone marrow functions. Because the whole person or a whole arm is placed within this counting device, alignment is unnecessary and no knowledge of anatomy is needed to perform these measurements. A 2-minute counting time is used. This, along with the minute amount of radioisotope needed and the great precision of the counter, makes such analyses safe, rapid, inexpensive, and accurate . . . (From 16-page reprint of paper presented at the Hearings on Applications of Radioisotopes and Radiation in the Life Sciences, Joint Committee on Atomic Energy, U. S. Congress—March 27, 1961, compliments of Packard Instrument Co., Inc., La Grange, Ill.)

FOR THIS LITERATURE CIRCLE 234 ON READER-SERVICE CARD

## Portable Micro Hematocrit

The YSI Model 30 is based on the electrically insulating characteristics of red cells. Essentially the conductivity of a carefully controlled blood volume (amount be-

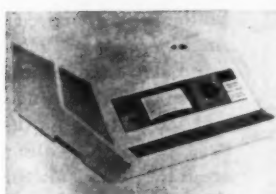


tween electrodes in cell) is measured and results read from a meter directly calibrated in hematocrit per cent units. Electronically a 10-kc oscillator drives a Wien bridge circuit. Two arms of the bridge consist of a precision center tapped transformer. A thermistor-resistor is the third arm of the bridge and automatically compensates for ambient and cell temperature. The unknown resistance consisting of a sample of blood in a fixed volume cell is the fourth arm. Bridge balance corresponds to a zero reading, unbalance of the bridge is a measure of volume concentration of red blood cells. The hematocrit cell is designed to have a negligible polarization impedance at 10-kc. The method is outlined in detail in *IRE Transactions on Medical Electronics*; Vol. ME-7, pp 188-192: "An Electrical Method to Determine Hematocrits" by R. H. Okada and H. P. Schwan . . . (From new Data Sheet, Yellow Springs Instrument Co., Yellow Springs, Ohio.)

FOR THIS LITERATURE CIRCLE 235 ON READER-SERVICE CARD



## Gamma-Ray Counting and Computing

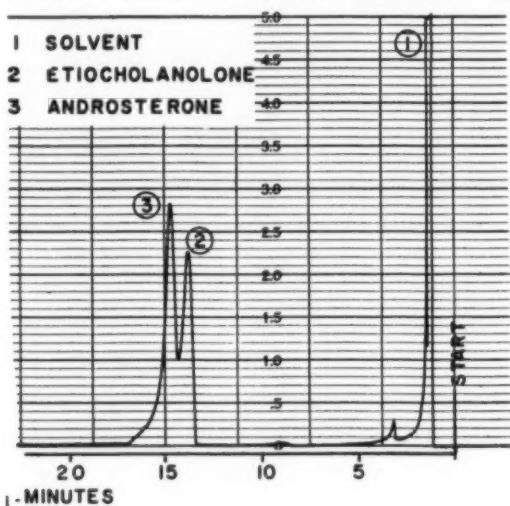


The Gammacord is a fully transistorized instrument for assay of gamma emitting radioisotopes... Transistorized circuits are noise free. The Gammacord utilizes this advantage by setting the discriminator level much lower than usual. The result is higher counting rates for a given sample... The total number of signals is measured for any of 4 time intervals (0.25; 1; 4; 16 min) and the result is presented in normalized form as counts per minute, independent of counting time selected... A built-in non-blocking rate-meter activates a red front panel light indicating "Sample too Strong" when a hot sample is inserted into the well. This circuit is continuously operating... Medical applications: *In Vitro* Thyroid Function Excretion Measurements—Schilling, g.i. bleeding, metabolism; Circulatory Studies—red cell survival, plasma disappearance, iron turnover, fat metabolism, clearances; Dilution Determinations—body water, Na, K space... (From 4-page Form 500G, Atomium Corp., Affiliate of Perkin-Elmer, 940 Main St., Waltham 54, Mass.)

FOR THIS LITERATURE CIRCLE 236 ON READER-SERVICE CARD

## Applications of Gas Chromatography

With the invention of Golay columns and ionization detectors, greatly increased sensitivity, response and resolution have enhanced the gas chromatograph's ability at quantitative and qualitative determinations even under



the rigorous conditions of micro-analysis... This powerful instrumental procedure can provide hitherto unattainable... accuracy, with speed, in difficult but basic medical and clinical research procedures... Through esterification, the fatty acids become readily analyzable by gas chromatography... Generally, the classical, tedious "wet" chemical, or the relatively inaccurate paper chromatographic method has been used... to separate, identify and measure sugar glycosides. Gas chromatography now makes it possible to accomplish this work with more accuracy, and more rapidly... There are about 22  $\alpha$ -amino acids which occur in nature... Gas chromatography has made exact identification and measurement of these vital substances a routine laboratory procedure, no matter how small the sample...

Parallel packed columns may be successfully used for rapid gas chromatographic analysis of respiratory gases, giving the anaesthesiologist, for example, five-minute assays of such exhaled components as oxygen, nitrogen, carbon dioxide, carbon monoxide, cyclopropane and ethylene... The importance of steroid analysis in the diagnosis of certain important clinical disorders is only recently becoming fully realized. Gas chromatography is again providing answers routinely... (From new 4-page folder. For more information and reprints on gas chromatography in medicine, including a recent bibliography, write to Perkin-Elmer Corp., Instrument Div., Main Ave., Norwalk, Conn.)

FOR THIS LITERATURE CIRCLE 237 ON READER-SERVICE CARD

## Heart Massager

CHICAGO, ILL.—New Mechano Cardiac Pulsator (to be available in 1962) replaces the surgeon's hand in massaging a heart that has stopped beating, offers a better chance to restart the heart's rhythmic pumping action. Pump sends compressed air through a rubber tube to a latex cuff that fits around the heart. Development has been by University of Chicago scientists in cooperation with the Armour Research Foundation.

## PORTABLE O<sub>2</sub> UNIT



New NCG-METROX supplies 305 liters of oxygen (51 minutes) for use in emergencies. Regulator adjusts constant flow from 3 to 12 liters per minute. Unit has oxygen pressure gage, plastic mask with intake and exhaust valves, carrying case, refilling adapter and wrench.—NCG Div., Chemetron Corp., 840 N. Michigan Ave., Chicago 11, Ill.

CIRCLE 238 ON READER-SERVICE CARD

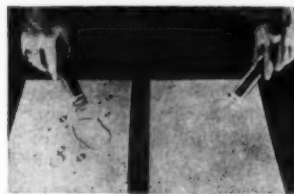
## DISPOSABLE CULTURE TUBES



New borosilicate-glass Culture Tubes are priced less than cost of cleaning, handling and storing conventional tubes; are for tissue culture work, water sampling and clinical and biological testing in pharmaceutical and public health labs. Available in sizes from 10 x 75 mm to 25 x 150 mm.—Laboratory Glassware Dept., Corning Glass Works, Corning, N. Y.

CIRCLE 239 ON READER-SERVICE CARD

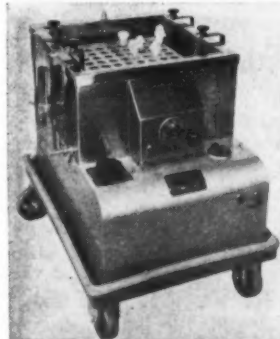
## AIR FILTERS



New Ultra-Aire space filter elements remove 99.97% particles to 0.3-micron dia, have increased moisture resistance due to water-repellent filter medium adapted to applications in pharmaceutical, photographic, optical, and other processing industries. Water forms into globules on new medium (left), which sheds moisture and is long lasting in comparison with former, absorbent material.—Mine Safety Appliances Co., 201 N. Brad-dock Ave., Pittsburgh 8, Pa.

CIRCLE 240 ON READER-SERVICE CARD

## WATER BATH SHAKER

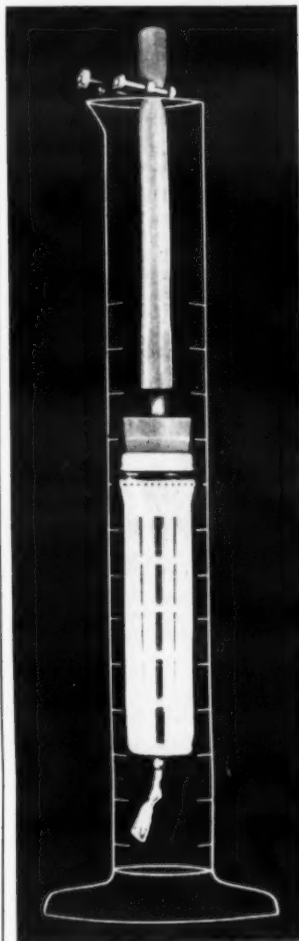


New Gyrotory Water Bath Shaker, continuous-duty lab apparatus for metabolic incubation and other experimentation involving agitation at controlled temperatures, operates on or beneath desks and lab benches. Water bath heats rapidly to pre-set temperatures from ambient to 100°C with uniformity of  $\pm 1/4^\circ\text{C}$ . Agitation speeds adjust between 85 and 285 rpm, are unaffected by load changes or line fluctuations. Seventeen interchangeable shaking platforms, including "EriAngle" clamps which incline base of flask at 15° or 30°, producing more efficient aeration and faster reactions.—New Brunswick Scientific Co., Inc., Box A-606, New Brunswick, N. J.

CIRCLE 241 ON READER-SERVICE CARD

# THE NEW LKB ULTRAFILTER

for concentrating protein solutions, body fluids, suspensions of micro-organisms...



Operating by vacuum suction, the DIP-TYPE ULTRAFILTER, consisting of a dialysis membrane supported by a Nylon framework, represents a significant improvement in methods of concentrating complex mixtures of biological compounds.

## THE PROCESS

leaves labile substances unharmed, causes no alteration in salt concentration, achieves high filtration rates up to 14 ml/hour, permits easy selection of end volume.

## THE UNIT

is constructed to eliminate risk of contamination, withstands sterilization, handles large volumes comfortably, fits easily into normal refrigerators, has low initial and operating costs.

The LKB 6300A Ultrafilter is stocked by leading laboratory supply houses in the United States and Canada.

Price f.o.b. Shipping Point \$14.90

WRITE FOR BULLETIN 6300EM

LKB INSTRUMENTS, INC.

4840 Rugby Ave., Washington 14, D.C.

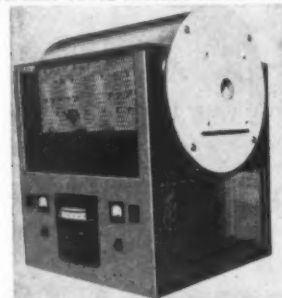


International Headquarters: LKB-Produkter AB, P.O.B. 12220, Stockholm 12, Sweden

CIRCLE 25 ON READER-SERVICE CARD

## ELECTRIC COMBUSTION TUBE FURNACE

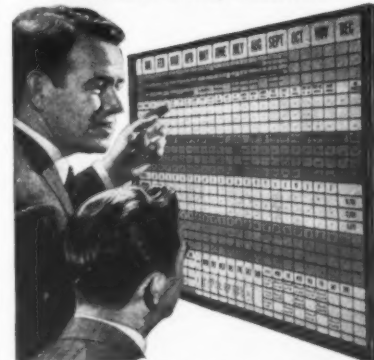
New SC-32 electric combustion tube furnace incorporates new Thermionik Power System, which uses thyatron electronic tubes instead of convention-



al contactors and saturable reactors. The tube furnace produces 2600°F max., provides a 12" uniform heat zone in a 2 1/2" O.D. ceramic tube, and is rated at 7 kw. Use of electronic tubes, with resultant savings in space, weight and initial cost, has been made practical through development of a stable plug-in grid-biasing unit. The Thermionik Power System is usable with any d-c producing or proportioning slidewire control system, or may be operated manually. The furnace is mounted on a steel-enclosed base which houses instrumentation and auxiliary equipment. Bulletin 206-5.—Despatch Oven Co., 619 S. E. 8 St., Minneapolis 14, Minn.

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## How To Get Things Done Better And Faster



## BOARDMASTER VISUAL CONTROL

- ☆ Gives Graphic Picture—Saves Time, Saves Money, Prevents Errors
- ☆ Simple to operate—Type or Write on Cards, Snap in Grooves
- ☆ Ideal for Scheduling, Maintenance, Inventory Production, Sales, Etc.
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**GRAPHIC SYSTEMS**  
YANCEYVILLE, NORTH CAROLINA

CIRCLE 26 ON READER-SERVICE CARD





## SENSITIVE BALANCE

to 0.1 microgram (10<sup>-7</sup> grams)  
Capacity: 1.5 grams

## BUT NOT SENSITIVE

TO

- VIBRATION
- TEMPERATURE
- HUMIDITY
- LEVEL
- OPERATOR TRAINING OR EXPERIENCE

The Cahn GRAM Electrobalance is designed for weighing small samples, from one gram down as far as you can go. It makes micro weighing faster and easier than weighing in the standard analytical range. It can extend the capabilities of your laboratory, at modest cost.

WRITE FOR FULL DETAILS:

**CAHN** instrument company  
14511 Paramount Blvd., Paramount, Calif., U.S.A.

CIRCLE 27 ON READER-SERVICE CARD

## CHANGES FORCE

### INTO ELECTRICAL SIGNALS

Experiment with mechanical force, motion, pressure, altitude, vacuum, strain, shock, vibration, acceleration, impact, flow, frequency, weight, thrust, high speed counters, relays, magnetic force, inverters, besides medical, bio-medical, dental, psychological & prosthesis with artificial fingers that feel.



For research laboratories making investigations on parts of difficult shape, thin areas, missile parts, human engineering. One drop of this paint will change resistance thousands of ohms. Six (6) types available with force ranges covering grams to tons.

Send for descriptive literature.  
Box 165,

**CLARK**  
ELECTRONIC LABORATORIES  
PALM SPRINGS, CALIFORNIA

CIRCLE 28 ON READER-SERVICE CARD

### READER INQUIRIES (Cont.)

#### Micro-Min Pressure Transducers

Research scientist in university division seeks micro-miniature pressure transducers. Range, 0-100 psig (approximate). M-146

#### pH, pCO<sub>2</sub>, pO<sub>2</sub> in Vivo

Assistant chief of anesthesiology in Air Force hospital wants to measure pH, pCO<sub>2</sub>, pO<sub>2</sub> in vivo, cardiac output, and cerebral blood flow during surgery. M-147

#### Peripheral Circulation

Chief of anesthesiology in hospital is interesting in peripheral circulation. M-148

#### Pulse-activated Monitor

Private physician would like to get device, battery powered, strapped to wrist, activated by pulse alone with visual and/or aural alarm. M-149

#### Brain Wave Recording

Doctor in hospital EEG lab wants to measure brain wave recordings in order to localize brain disorders. Present measurements with standard clinical EEG machines lack depth data and certain frequencies. M-150

#### Blood pH, pCO<sub>2</sub>, pO<sub>2</sub>

Researcher in college department of physiology wishes to measure pH, pCO<sub>2</sub>, pO<sub>2</sub> in flowing blood for respiration studies. M-151

#### Body Pressures and Acceleration

Safety engineer in institute of agricultural medicine wishes to measure pressures and accelerations of body from vibration of agricultural machinery. Remote recording may be necessary. M-152

#### Blood Flow

Orthopedist in medical school wants to measure blood flow in acute injuries and controls. M-153

#### Muscle Potential

Assistant professor in university speech correction department wishes to measure muscle potential in speech production. M-154

#### Fetal Heart Tones

Physician with private practice wishes to measure fetal heart tones excluding static of usual pickups. M-155

#### Hematology Determinations

Physician wishes to obtain information on hematology determinations (blood chemistry). M-156

#### Body Sway

Professor of pharmacology engaged in alcohol research in medical school wants to measure body sway (in Romberg Test) of blindfolded subjects without connecting apparatus to the body. Range of linear measurement required is from 0-50 cm to each side. M-157

#### Iodine in Blood Serum

Physician doing cancer research seeks method of rapidly determining iodine in blood serum. PBI is too slow and expensive. M-158

#### Blood pO<sub>2</sub>

Research associate of children's cardiac lab needs simple temperature-compensated system to measure blood pO<sub>2</sub> in hypothermic state while using heart-lung machine. M-159

#### DC-Potential Recording

Research assistant in mental health research institute wishes to record DC potentials from rat spinal cord. Needs high input impedance. M-160

#### Agglutination of Red Blood Cells

Physic professor needs quantitative determination of agglutination of red blood cells. Application: research in immunology. M-161

### Computer Analysis

Professor of neurology in university medical center wants to analyze EEG's with a computer. M-162

#### Muscle Potential Record

Member of pharmacology department, medical college, is interested in equipment for measurement of potentials from isolated nerve muscle preparation while simultaneously measuring contractile force of frog sartorius muscle. Unit and range of measurement 0.1-10 mv, dc to 5000 cps. Technique now in use furnishes no permanent record, nor is the record entirely satisfactory. M-163

#### Blood Flow Recording

Professor of surgery at medical school wishes to measure and record blood flow within intact human body. M-164

#### Blood Temp Thermistor

Technical director of hospital medical department wants to use a small thermistor to measure blood temperature between 34°-40°C, sensitive to 3°. M-165

#### Respiration

Physician in hospital wants instrumentation to assist and control respiration under anesthesia and intermittent positive pressure treatments. M-166

#### Blood-flow and BP Gradient

Director of research in college department of medical instrumentation wishes to measure blood-flow and blood-pressure gradient at frequencies from 0-100 cps to determine frequency response of vasculature. M-167

#### Intensity of Fluorescence

Veterinarian wishes to measure and record intensity of fluorescence in tagged antibody-antigen unions. M-168

#### Oxygen Saturation

Director of cardiopulmonary lab wishes to measure oxygen saturation at cardiac catheter tip without sampling. M-169

#### Venous Pulse Pressures

Director of research in biology research lab wishes to measure venous pulse pressures. M-170

#### Instruments for Perceptual Studies

Physiological research technician desires catalogs on instrumentation for perceptual studies. M-171

#### Automatic Titration

Research chemist in foundation institute requires automatic titration and recording of organic acids in biologic tissue. M-172

#### Continuous Na<sup>+</sup> and K<sup>+</sup> Measurement

Professor of physiology wishes to measure Na<sup>+</sup> and K<sup>+</sup> continuously to obtain high perfusion. M-173

#### Blood Viscosity

Physician in VA hospital wishes to measure viscosity of blood at varying temperatures in extracorporeal circulation. M-174

#### Radio Transmitter for EEG

Graduate student in college division of biology requires small radio transmitter for EEG recording in cats. M-175

#### Blood Pressure Recording

Professor of anatomy wishes to obtain a continuous record of blood pressure in free-moving cat without cannulating an artery. Range: 60-300 mm Hg. M-176

#### Hi-Fi Stetophone

Physician in clinic wishes to obtain hi-fi stetophone; portable 3-oz ECG transmitter and ECG to measure spatial VCG. M-177

### Multi-Purpose Balances

#### Reading scale



Weight = 128.8452 g



Weight = 95.5580 g



Weight = 137.365 g

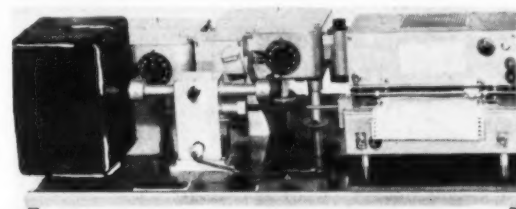
The new Mettler Multi-Purpose Balances fill the gap . . . between Analytical and Precision Balances in respect of size of optical range and indicating accuracy . . . The indicating accuracy of a balance chiefly depends on: (a) the amount of the lever error when the sample and the weights are compared on two different beam arms, (b) the amount of the sensitivity error depending on variable load on the balance, (c) the calibration accuracy of the set of weights, (d) the accuracy of the indicating element (scale graduation).

With the Mettler balance, lever and sensitivity errors cannot occur at all, owing to the system of substitution weighing applied. The remaining amount of error in the calibration accuracy of the set of weights and in the scale graduation can be kept within very close limits . . . (From 12-page brochure, Mettler Instrument Corp., Hightstown, N. J.)

FOR THIS LITERATURE CIRCLE 243 ON READER-SERVICE CARD

### Spectrofluorometer

The Farrand Spectrofluorometer, developed by the Farrand Optical Co., Inc. in cooperation with outstanding scientists at the National Institutes of Health, is an analytical instrument for identification and analysis by fluorometric methods. For many purposes the spectro-



fluorometric method is more discriminating than the conventional colorimetric or spectrophotometric techniques. This instrument is designed so that the chemical components under investigation can be irradiated in any chosen wavelength of the ultraviolet, visible, or infrared portions of the spectrum. This irradiation is accomplished through an excitation monochromator and the measurement of the resulting fluorescence, in any chosen wavelength, is accomplished through an analyzing monochromator . . . The Farrand Spectrofluorometer is now supplied with a transmission attachment for measuring absorption or transmission . . . (From Bulletin 820, plus list of Farrand Spectrofluorometer users and references, Farrand Optical Co., Inc., Bronx Blvd., and E. 238 St., New York 70, N. Y.)

FOR THIS LITERATURE CIRCLE 244 ON READER-SERVICE CARD

### Standard Materials

The National Bureau of Standards offers a 27-page booklet, "Standard Materials," which includes spectroscopic standards, pH standards, hydrocarbons and organic sulfur compounds, chemicals (acid potassium phthalate, benzoic acid, sodium oxalate, arsenic trioxide, potassium dichromate, uranium oxide, sugars) and miscellaneous standard materials (phosphors, light-sensitive papers, etc.). A 4-page article, "A Standard for the Measurement of the pH of Blood and other Physiological Media" by Vincent E. Bower, Maya Paabo, and Roger G. Bates, appeared in *Journal of Research of the National Bureau of Standards—A. Physics and Chemistry*, Vol. 65A, No. 3, May-June 1961. The authors propose a buffer solution containing potassium dihydrogen phosphate (0.008695 molal) and disodium hydrogen phosphate (0.03043 molal) as a pH standard for the physiologically important range, pH 7 to 8. The proposed standard solution is prepared by dissolving 1.179 g (air weight) of potassium dihydrogen phosphate and 4.303 (air weight) of potassium dihydrogen phosphate and 4.303 (air weight) of disodium hydrogen phosphate in ammonia-free water and diluting to 1 liter at 25°C. The ionic strength is 0.1.

Readers who can supply information in answer to these inquiries are asked to write to the Editor. Please refer to specific Inquiry Numbers.



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2	22	42	62	82	102	122	142	162	182	202	222	242	262	282	302	322	342	362	382	402	422	442	462	482
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19	39	59	79	99	119	139	159	179	199	219	239	259	279	299	319	339	359	379	399	419	439	459	479	499
20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400	420	440	460	480	500

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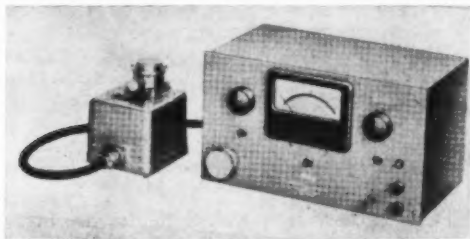
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## Radioactivity Measurement

Ionization chamber-electrometers find many uses in nuclear and radiation research. They are used in pocket dosimeters, portable radiation monitors, fixed radiation monitors (particularly around radiation sources and



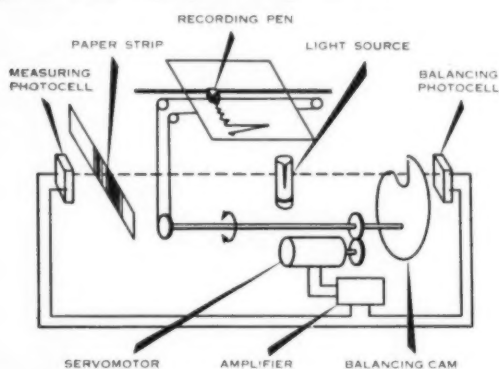
reactors), activity measurement of air-borne alpha activity and in the determination of respired  $C^{14}$  from animals and patients . . .

The oxidation of a labeled compound to  $C^{14}O_2$  in an animal or tissue homogenate, culture or slice may be easily studied using the ionization chamber-electrometer as the activity detection device . . . Air can be swept or pushed through an ionization chamber. The activity can be continuously measured using the High-Resistance-Leak method and a recorder connected to the electrometer (Cary Vibrating Reed Electrometer, Model 31 or 32) will provide a continuous record of the exhaled biochemical and physiological process with in-vivo systems; it makes possible easy non-destructive rate studies on intact systems . . . (From 14-page technical paper, "Experiment Using an Ionization Chamber and Vibrating Reed Electrometer for Radioactivity Measurements," by Bert M. Tolbert, University of Colorado, Chemistry Department; available from Applied Physics Corp., 2724 S. Peck Rd., Monrovia, Calif.)

FOR THIS LITERATURE CIRCLE 245 ON READER-SERVICE CARD

## Paper Electrophoresis

In paper electrophoresis, the ions migrate along a strip of porous filter paper which is saturated with an electrolyte. A potential gradient is applied across the length of the strip. When ions of different mobilities are started together on the strip, they will migrate at different speeds. After a suitable time, the ions will be separated into distinct mobility classes, forming separate bands along the strip. The filter paper acts as a stabilizing medium which overcomes convection, making possible separations which are quite pure, and extending the electrophoresis technique to small, rapidly-diffusing ions . . .



Paper electrophoresis has grown most rapidly in the medical field because it offers the research worker and pathologist a simple means of performing the previously-difficult separation of proteins, amino acids, nucleic acids, peptides, and other important biochemical material . . . Paper electrophoresis has been used for separations in other body fluids than blood; spinal fluid, ascitic fluid, synovial fluid, tears, urine, etc. It is used for detecting and identifying steroids, alkaloids, the free amino acids and polypeptides of serum and urine. Enzymes, hormones, vitamins, viruses, antibiotics have been studied . . . (From 8-page Bulletin SBR-2, Beckman Instruments, Inc., Spinco Div., Palo Alto, Calif.)

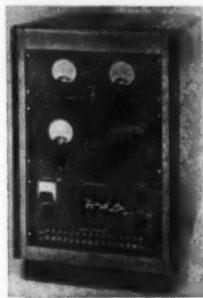
FOR THIS LITERATURE CIRCLE 246 ON READER-SERVICE CARD

## Heart Screening

CHICAGO, ILL.—A mass screening method for finding heart defects in children consists of recording children's heart sounds on high fidelity tapes which are later read by specially trained cardiologists. It was verified as 91% accurate in a test of 33,026 Chicago public elementary school children. This degree of accuracy ranks with the best public health detection techniques developed in any field, including chest X-rays to discover tuberculosis.

The project was pioneered by the Chicago Heart Association (an affiliate of the American Heart Association) in conjunction with three other Chicago agencies. Abnormalities were found in two children per thousand screened, a total of 64 children. Abnormalities in 32 children (half the cases discovered) were previously undetected.

## AIRBORNE-PARTICLE MONITOR



New Model PC200A Airborne-Particle Monitor used with Model DS 250 Air-Dilution System provides instrument capable of describing spectrum of particles present in specimens of air ranging from clean-room atmospheres to polluted industrial smogs. Dilution System, available by itself, furnishes continuously variable filtered dilution air from 0 to 200 cc/min to basic sample, giving dilution ratios from zero to 50:1. Monitor unit examines 15 sub-ranges of particle sizes from 0.32 to 8 microns, indicates on decade registers, records by galvanometer, potentiometer, or digital printer. Particle concentrations to 7340 per minute can be counted with normal 100-cc/min sample input. Manual selection or automatic scanning. In programmed operation, instrument allows 0.3, 1, 3, or 10 minutes of monitoring at each range.—Royco Instruments, Inc., 440 Olive St., Palo Alto, Calif.

CIRCLE 247 ON READER-SERVICE CARD

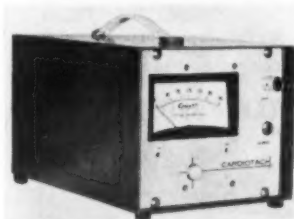
## MODULATED CURRENT STIMULATOR



New Model G Medcolator provides alternating, interrupted, modulated current of high or low frequency, superimposed on rectified current for pulse, surge, tetanize and reciprocal settings. Cycle timer incorporates automatic cycle change every 3 minutes. Straight or interrupted d-c current permits stimulation of denervated muscles.—Medco Electronics, Co., Inc., 3601 E. Admiral Place, Tulsa, Okla.

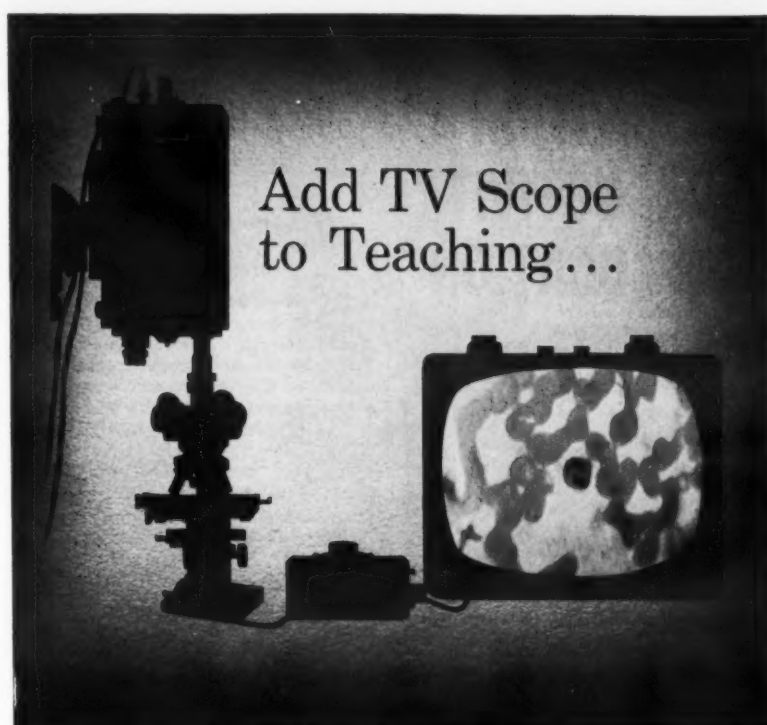
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## PORTABLE CARDIOTACHOMETER



New self-contained, portable Cardiometer employs a simple analog computer circuit to convert the period between heartbeats into a rate measurement, provides a continuous indication of pulse rate, using input signals from arm and ankle electrodes. Sixty cycle interference rejection effectively shields ECG and EEG recorders. The Cardiometer derives a pulse, representing the principal energy content of the QRS complex, coincident with each heartbeat. The rate is displayed logarithmically on a beat-by-beat basis, facilitating detection of arrhythmia, and providing superior accuracy to linear metered measurements. The standard output mode of the unit is an illuminated meter, logarithmically calibrated from 40 to 160 beats per minute. Also available are an optional meter-recorder that continuously plots pulse rate vs. time and connections for an external recorder to provide a permanent record of heart rhythm.—Epaco Medical, Div. Epaco, Inc., 275 Massachusetts Ave., Cambridge 39, Mass.

CIRCLE 249 ON READER-SERVICE CARD



**Elgeet**  
of Rochester

## Now Closes The Cost "Gap" On Closed Circuit TV

A COMPLETE system, including a research microscope, TV camera, and 17" monitor with 300 line horizontal resolution is now available from Elgeet of Rochester for **UNDER \$1500**. A COMPLETE system with 600 line resolution is available for **UNDER \$2200**.

Elgeet Closed Circuit Television Microscope-Integrated Systems, at these AMAZINGLY LOW prices, are the finest quality teaching tools that educators can buy for student-training programs.

For full details, write TODAY for Elgeet Booklet TV58-1.

**Elgeet OPTICAL CO., INC.** . . .

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Precision Engineering our constant goal"

CIRCLE 29 ON READER-SERVICE CARD

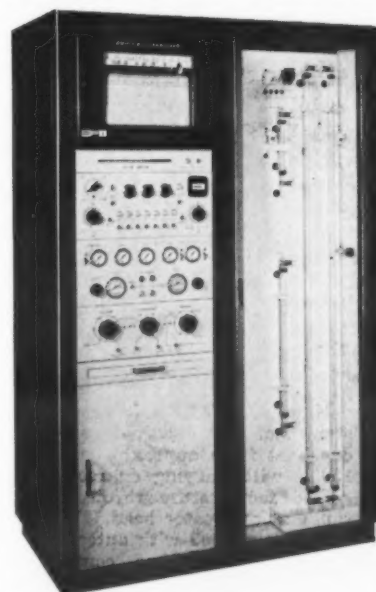
## New PHOENIX AMINO ACID ANALYZER

### MODEL K-8000

Automatic Analysis of  
Amino Compounds in

- Protein Hydrolysates
- Protein free plasma and other
- Physiological fluids
- Tissue extracts
- Hydroponic solutions
- Foods
- Culture media
- Pharmaceuticals
- Adaptable to Phoenix Stream Splitting System 5500

Sensitivity: 0.1 to 3.0 micromoles of amino acid with a precision of  $100 \pm 3\%$ . Useful results at even lower levels.



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## MEASURE SOLUTION CONDUCTIVITY "ON-LOCATION"



### with this new L&N PORTABLE Conductivity Monitor

This light-weight, compact Conductivity Monitor is completely transistorized. Its advanced circuitry assures reliable direct-reading measurements — in laboratory or on process line.

#### Exceptional features include:

- a wide choice of ranges — simply by multiplying the scale reading by the cell constant;
- automatic or manual compensation;
- an output d-c signal for recorder or other data-logging equipment;
- easy connection of leadwires to external terminals on back panel.

Price of the 4958 Portable Conductivity Monitor is \$225, f.o.b. Phila. (subject to change without notice). Ask for Data Sheet E-95(3) from Leeds & Northrup Company, 4930 Stenton Ave., Philadelphia 44, Pa.



CIRCLE 31 ON READER-SERVICE CARD

### LOW-FREQUENCY APPARATUS

New Augospel super-low-frequency apparatus utilizes low-frequency rectangular pulses generated from low impedance source to eliminate most

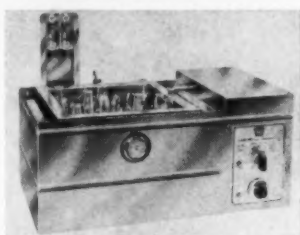


of shortcomings inherent in electrotherapy, particularly pain. Applications: muscle stimulation; sedation analgesia, electric stimulation for muscle paralysis, iontophoresis.—Calhear Instruments Co., 412 W. 6 St., Los Angeles 14, Calif.

CIRCLE 250 ON READER-SERVICE CARD

The January-February  
issue of Medical  
Electronics News will  
feature a survey of  
Event Recorders.

### SHAKING BATH



New transistorized thermistor sensing and control circuit for Dubnoff Shaking Bath pre-senses and controls any change in temperature within  $\pm 0.05^\circ\text{C}$ . Uniformity of control at all temperatures is rated at better than  $0.1^\circ\text{C}$ . Typical uses: incubation of tissue slices, protein coagulations, studies of tissue slices and homogenates in atmospheres of individual or mixed gases, etc. Bulletin 184.—Labline, Inc., 3070 W. Grand Ave., Chicago 22, Ill.

CIRCLE 251 ON READER-SERVICE CARD

### HOLLOW-CATHODE DISCHARGE TUBES



Five new types of hollow-cathode Discharge Tubes for use in atomic absorption spectroscopy, a technique especially useful for rapid analyses of soils, body fluids and trace elements in precious metals, feature low starting voltages, low operating voltage, and stable current. Output spectral lines are narrow and steady after short warmup. Special tubes with variations of cathode material, gas fill and output window available.—Westinghouse Electronic Tube Div., Box 284, Elmira, N. Y.

CIRCLE 252 ON READER-SERVICE CARD

### GAS-TIGHT SYRINGE



New Gas-Tight Syringe with 0.05-ml capacity features stainless steel plunger plated with rhodium, and Teflon gasket tip for firm but smooth, spillproof plunger movement. Ideal for gas chromatography and for pipetting gasses and corrosive liquids, particularly liquids which ordinarily cement syringe plungers to barrel. Leak rate is less than  $3 \mu\text{l/hr}$  under 20-mm Hg vacuum, with no apparent leakage to 3 atmospheres. Calibrated in ml at  $20^\circ\text{C}$ , with scales accurate to 1% or better. Syringes available in 0.10, 0.25, 0.50, 1, 2, 5, and 10-ml sizes.—Hamilton Co., Inc., Box 307, Whittier 33, Calif.

CIRCLE 253 ON READER-SERVICE CARD

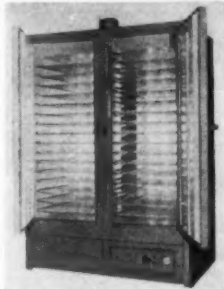
### INSTANTANEOUS HEAT/COLD INSTRUMENT



New KOL-THERM produces instant moist or dry cold or moist or dry heat from approximately  $30^\circ$  to  $130^\circ\text{F}$  with varying degrees of controlled temperature throughout this range at applicator head. The instrument is equipped with automatic controls for on-off, time, contrast and temperature. Instant moist or dry cold and/or heat may be simultaneously applied with electric muscle stimulation.—Medco Electronics Co., Inc., 3601 E. Admiral Place, Tulsa, Okla.

CIRCLE 254 ON READER-SERVICE CARD

### GROWTH CHAMBERS



New line of Growth Chambers includes models ranging from reach-in and walk-in units to special constructed growth rooms with radio-active atmospheres, polluted air, positive or negative pressures. Light intensities up to 10,000 f/c, humidity ranges from 13% to 100% RH, and temperatures from freezing to more than  $100^\circ\text{F}$  are available.—National Appliances Co., 7634 S. W. Capitol Hwy., Portland, Ore.

CIRCLE 255 ON READER-SERVICE CARD

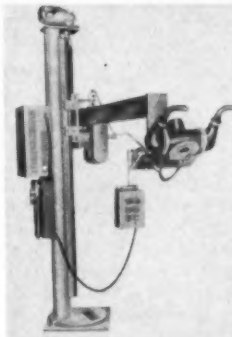
### TOTAL SOLIDS METER



New TS Meter determines % total solids and water content of serum and plasma and immediate analysis of urinary specific gravity with accuracy and reproducibility of  $\pm 0.001$  units at  $20^\circ\text{F}$ . (Method was developed in cooperation with Dr. A. V. Wolf, now Head of Dept. of Physiology at University of Illinois College of Medicine, Chicago.) Meter is temperature compensated, automatically adjusting to correct refractive index within 0.0001 deviation between  $65^\circ$  and  $95^\circ\text{F}$  so that specific gravity and total solids are read directly on internal scales; requires no more than 0.05-ml sample. Range of scale for total solids is 0-15%; range of scale for specific gravity, 1.000 to 1.035. Applications include: screening procedures approximating protein content of serum or plasma; evaluating fluids from peritoneum, pleura or cysts and defining them as transudates or exudates; rapid checking of solutions, particularly of large molecular weight; checking collections from ureteral catheters where differentiation between two kidneys is important; testing oliguric patients; teaching in clinical, pharmacy and physiology laboratories; studies in urine and plasma concentrations in small animals, pediatrics, etc., where sample size is limited; tracing course of hydropnea and anhydremia during therapy and in disease states such as cholera, thermal stress, hemorrhage and diabetes insipidus; checking concentrations of reagents in chemical laboratories, prescriptions, etc.—American Optical Co., Instrument Div., Buffalo 15, N. Y.

CIRCLE 256 ON READER-SERVICE CARD

### X-RAY HEAD POSITIONER



New X-ray head Positioner, modified Model 66 Welding Head Manipulator, moves X-ray head 6' vertically and 6' horizontally, rotates it  $90^\circ$  from horizontal to vertical, and  $90^\circ$  from side to side by remote control.—Ransome Co., Route 22, Scotch Plains, N. J.

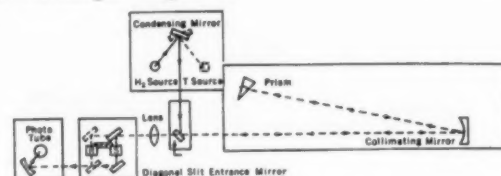
CIRCLE 257 ON READER-SERVICE CARD

—PLAN TO ATTEND—  
2ND ANNUAL SAN DIEGO  
SYMPOSIUM AND EXHIBIT ON  
BIOMEDICAL ENGINEERING  
JUNE 20-22, 1962

For details see page 32.

## Ultraviolet Spectrophotometer

The Beckman DB Spectrophotometer is a compact, direct-reading, easily-operated double-beam instrument which provides accurate, low-cost versatility for transmittance and absorbance measurements in the 205 to 770  $\mu\text{m}$  wavelength range . . .

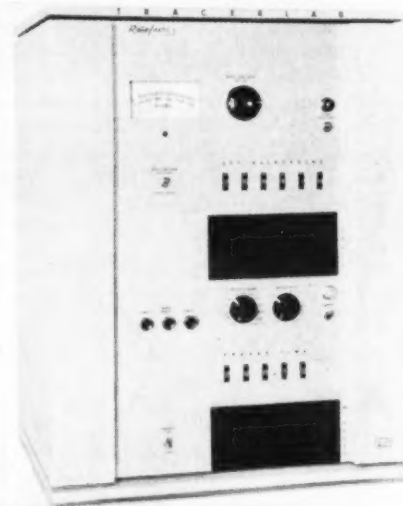


The DB is exceptionally well-suited for use in a wide range of applications . . . Medical—Analyses for enzymes, vitamins, hormones, steroids, alkaloids and barbiturates are some of the important medical applications for the DB. The instrument is designed to perform many of the measurements now used by the physician in his diagnosis of diabetes mellitus, kidney damage, myocardial infarction, and numerous other ailments . . . Pharmaceutical—The DB is ideal for quality control of raw materials, bulk production batches, and finished products. As a ratio-recording instrument, the DB offers spectra for identification and quantitation, provides entire absorption spectra within a few minutes, permits the determination of several components simultaneously, and offers evaluation of single components when interfering substances are present . . . (From 16-page Bulletin 779-B, Scientific and Process Instruments Div., Beckman Instruments, Inc., Fullerton, Calif.)

FOR THIS LITERATURE CIRCLE 258 ON READER-SERVICE CARD

## Automatic Sample Counting

The Ratio/Matic Scaler is a new Tracerlab development designed to ease the problem of data handling and to provide automatic sample counting results in the form of the net count ratio for each sample as compared to a standard reference. The use of this scaler in an automatic counting system eliminates the need for separately subtracting the background count rate by manual compu-



tation as well as the comparison of each sample count to a known standard. The elimination of these steps may speed the entire analytical process and provide data in a more useable form.

The Ratio/Matic Scaler is provided with two features not previously found in automatic equipment. (1) Provision for setting any time integer from 0.01 to 999.99 minutes as the counting time. (2) Provision for subtracting from the total count registration any fixed number of counts . . . (From new brochure, Keleket Div., Tracerlab Inc., 1601 Trapelo Rd., Waltham 54, Mass.)

FOR THIS LITERATURE CIRCLE 259 ON READER-SERVICE CARD

## Neurochemistry Papers Indexed by Computer

WHITE PLAINS, N. Y.—Physicians and researchers seeking information on the chemistry of the nervous system, including such diseases as multiple sclerosis, can now use the 250-page "KWIC Index to Neurochemistry" for fast reference to more than 2,000 articles published in their field during the past 18 months. KWIC stands for "keyword in context," a new method of indexing that utilizes electronic data processing systems. A program enables the computer to select significant words from the titles of articles, arrange these keywords alphabetically, and print them out with several words preceding and following them in the original title at 600 lines a minute ready for reproduction. The Index was prepared by International Business Machines Corp. (Advanced Systems Development Div., 2 William St., White Plains, N. Y.). The KWIC Index has been used widely. Applications include Medical Titles, a sample issue containing titles from 2,800 papers published in 57 medical journals, prepared by the IBM Advanced Systems Development Division.

CIRCLE 260 ON READER-SERVICE CARD



# Literature

FOR COPIES, CIRCLE NUMBER ON CARD.

**TRANSISTORIZED EEG.** 8-page Bulletin 7611 describes Type TC Electroencephalograph (8 or 16 channels).—Invengineering, Inc., Belmar, N. J.

CIRCLE 261 ON READER-SERVICE CARD

**RECORDER.** 2-page Bulletins 3-61-1 and 181 describe Type RS and Type 542 2-channel Dynograph recorder.—Invengineering, Inc., Belmar, N. J.

CIRCLE 262 ON READER-SERVICE CARD

**PORTABLE ECG.** 4-page Bulletin CM161 describes Cardi-O-Mite 17-lb ECG.—Beck-Lee Corp., 630 W. Jackson Blvd., Chicago 6, Ill.

CIRCLE 263 ON READER-SERVICE CARD

**BIOTELEMETRY.** 6-page brochure presents 3-channel Multipack, Biotelemeter, Bioamplifier, oscillator and discriminator for physiological data acquisition.—Medical Electronics and Bionics Dept., Advanced Development Lab., Litton Systems, Inc., 336 N. Foothill Rd., Beverly Hills, Calif.

CIRCLE 264 ON READER-SERVICE CARD

**PHYSIOLOGICAL MONITOR.** 12-page bulletin and 4-page report describe complete recording system for biomedical parameters in OR or at bedside.—Invengineering, Inc., Box 360, Belmar, N. J.

CIRCLE 265 ON READER-SERVICE CARD

**BLOOD PUMP.** 10-page Technical Data Bulletin describes new Clark-Selas Perfusion Apparatus for oxygenation and pumping of blood during open-heart surgery.—Selas Flotronics, Div. Selas Corp. of America, Spring House, Pa.

CIRCLE 266 ON READER-SERVICE CARD

**OXYGEN FLOWMETER.** 2-page Bulletin NM-103.000 describes Recording Flowmeter that regulates, indicates, and totals oxygen used by patients.—National Cylinder Gas Div., Chemetron Corp., 840 N. Michigan Ave., Chicago 11, Ill.

CIRCLE 267 ON READER-SERVICE CARD

**SYNTHETIC CRYSTALS.** 4-page bulletin describes crystals for scintillation and optical studies, application in Gamma-Ray Spectrometer.—Harshaw Chemical Co., Crystal Div., 1945 E. 97 St., Cleveland 6, Ohio.

CIRCLE 268 ON READER-SERVICE CARD

**ZONE COMPARATOR.** 2-page bulletin describes electronic device that automatically measures diameters of zones of inhibition produced in microbiological assays of antibiotics.—Technical Controls, Inc., 239 Rose Hill Ave., New Rochelle, N. Y.

CIRCLE 269 ON READER-SERVICE CARD

**DOSE-RATE ALARM.** Data sheet describes Fido® pocket-size dose-rate Alarm which detects radiation hazards with loud warning sound.—Controls for Radiation, Inc., 130 Alewife Brook Parkway, Cambridge 40, Mass.

CIRCLE 270 ON READER-SERVICE CARD

**SCALERS.** Data sheets describe Model E-110 and E-115 Transistorized GM units and Model E-130 Analytical Scaler.—Radiation Equipment and Accessories Corp., 665 Merrick Rd., Lynbrook, N. Y.

CIRCLE 271 ON READER-SERVICE CARD

**RELAYS.** 2 Product Bulletins, M-9 and M-12, describe High Sensitivity Electronic Transistorized Relays, Models TR-116 and TR-116-B.—Med-Tronics Mfg. Co., Inc., 2019 Westchester Ave., Bronx 62, N. Y.

CIRCLE 272 ON READER-SERVICE CARD

**AIR POLLUTION.** 2-page Bulletin K-4023 describes Air Pollution Analyzers (Automatic Chemical Reagent Addition Analyzers) that monitor and record low concentrations of oxidants, oxides of nitrogen, or sulfur dioxide in atmosphere.—Beckman Scientific and Process Instruments Div., Beckman Instruments, Inc., Fullerton, Calif.

CIRCLE 273 ON READER-SERVICE CARD

**HEMOGLOBIN MEASUREMENT.** 4-page Bulletin B-237 describes Model 25 Photo-Hemoglobinometer for chemical analysis of Hb content of measured blood sample.—Coleman Instruments, Inc., 318 Madison St., Maywood, Ill.

CIRCLE 274 ON READER-SERVICE CARD

**HEMOGLOBIN CONCENTRATION.** 2-page brochure describes Model 1000 Hb-Meter for determining hemoglobin concentration in blood by its optical properties.—American Optical Co., Instrument Div., Buffalo 15, N. Y.

CIRCLE 275 ON READER-SERVICE CARD

**BLOOD FLOW.** 8-page Bulletin 10-14 describes Blood Flow Meter for extracorporeal circuits.—Foxboro Co., Foxboro, Mass.

CIRCLE 276 ON READER-SERVICE CARD

**CO<sub>2</sub> INCUBATION.** 16-page Bulletin 6051 describes CO<sub>2</sub> applications and incubators.—National Appliance Co., 7634 S. W. Capitol Hwy., Portland 19, Ore.

CIRCLE 277 ON READER-SERVICE CARD

**OXYGEN ANALYSIS.** Brochure describes GP-10 Gas Phase Oxygen Transducer.—Chemtronics, Inc., Box 417, San Antonio, Texas.

CIRCLE 278 ON READER-SERVICE CARD

**AMINO ACID ANALYSIS.** 12-page Bulletin K-8000 and 4-page Bulletin VG-6000 describe Analyzers for separation, identification and quantitative analysis of amino compounds.—Phoenix Precision Instrument Co., 3803-05 N. Fifth St., Phila. 40, Pa.

CIRCLE 279 ON READER-SERVICE CARD

**PARTICLE COUNTER.** 4-page Bulletin A-2 describes Counter that determines number and size of particles suspended in electrically conductive liquid.—Coulter Industrial Sales Co., Div. Coulter Electronics Inc., 2525 N. Sheffield Ave., Chicago 14, Ill.

CIRCLE 280 ON READER-SERVICE CARD

**GAMMA COUNTER.** 4-page Bulletin AN6502 describes Model 250 Amplifier-Analyzer for gamma scintillation counting.—Baird-Atomic, Inc., 33 University Rd., Cambridge 38, Mass.

CIRCLE 281 ON READER-SERVICE CARD

**CLOSED CIRCUIT TV.** 10-page brochure describes how closed-circuit TV can be used in hospitals.—Electronics Div., Fairbanks Morse & Co., 100 Electra Lane, Yonkers, N. Y.

CIRCLE 282 ON READER-SERVICE CARD

**DC AMPLIFIER.** 22-page booklet and 2-page data sheet describe DA-12 DC Amplifier with min. 1-megohm input, max. 15-ohms output.—United Electro-Dynamics, Inc., 200 Allendale Rd., Pasadena, Calif.

CIRCLE 283 ON READER-SERVICE CARD

**FLUOROMETRY.** 4-page brochures describe Model 110 and 111 Fluorometers and applications.—G. K. Turner Assoc., 2524 Pulgas Ave., Palo Alto, Calif.

CIRCLE 284 ON READER-SERVICE CARD

**SPECTRUM COMPARATOR.** 4-page bulletin describes Spectroline Scanner® projection comparator-microphotometer combination.—Applied Research Labs., Inc., Subs. Bausch & Lomb Optical Co., Box 1710, Glendale 5, Calif.

CIRCLE 285 ON READER-SERVICE CARD

**STOPPERING MACHINES.** 4-page brochure and data sheets describe sterile filling and stoppering machines.—C. W. Logeman Co., 633 Bergen St., Brooklyn 38, N. Y.

CIRCLE 286 ON READER-SERVICE CARD

**GLASS APPARATUS.** 32-page Bantamware Catalog BW-2 describes over 150 new items in line of small organic glass apparatus.—Kontes Glass Co., Vineland, N. J.

CIRCLE 287 ON READER-SERVICE CARD

**GAS CHROMATOGRAPH.** Bulletin describes new bench-size Chromalab Model A-110.—Glowall Corp., 2352 Fairhill Ave., Glenside, Pa.

CIRCLE 288 ON READER-SERVICE CARD

**CO<sub>2</sub> INCUBATION.** 16-page Bulletin 6051 discusses applications, techniques and instruments for CO<sub>2</sub> incubation procedures.—National Appliance Co., 7634 S. W. Capitol Hwy., Portland 19, Ore.

CIRCLE 289 ON READER-SERVICE CARD

**GLASSBLOWING.** Brochure describes kits and accessories for making and repairing glass apparatus, seals, etc.—Bethlehem Apparatus Co., Hellertown, Pa.

CIRCLE 290 ON READER-SERVICE CARD

**HIGH VACUUM EVAPORATORS.** Bulletin describes O-ring seals, small and large capacity evaporators, etc.—Rinco Instrument Co., Inc., Greenville, Ill.

CIRCLE 291 ON READER-SERVICE CARD

**VACUUM PUMPS.** 16-page catalog explains theory, construction, and performance of Duo-Seal pumps.—W. M. Welch Scientific Co., Div. W. M. Welch Mfg. Co., 1515 Sedgwick St., Chicago 10, Ill.

CIRCLE 292 ON READER-SERVICE CARD

**FILTERS.** 16-page bibliography lists published information concerning applications of Millipore® filters.—Millipore Filter Corp., Bedford, Mass.

CIRCLE 293 ON READER-SERVICE CARD

**MICROFILTRATION.** 44-page booklet presents information on Millipore® types, kits, applications and purchasing data.—Millipore Filter Corp., Bedford, Mass.

CIRCLE 294 ON READER-SERVICE CARD

**GAS CHROMATOGRAPHS.** 6-page Bulletin 6008-1, Data Sheet 6106-1, and Price List 6007-2 describe Model 300 and Model 609 Linear Programmed Temperature Gas Chromatograph.—F & M Scientific Corp., Starr Rd. and Route 41, Box 234, Avondale, Pa.

CIRCLE 295 ON READER-SERVICE CARD

**DENSITOMETERS.** Data sheet describes new models of Densichron instruments for determining densities of film negatives and positives, ink, etc.—Welch Scientific Co., Chicago 10, Ill.

CIRCLE 296 ON READER-SERVICE CARD

**SAMPLE CHANGER.** 8-page Bulletin SC-100 details Multi/Matic Sample Changer for automatic sample counting.—Tracerlab, 1601 Trapelo Rd., Waltham 54, Mass.

CIRCLE 297 ON READER-SERVICE CARD

**BLOOD pH.** 4-page bulletin presents equipment for blood pH analysis—blood electrodes, measuring chain, compensator, thermostat and buffers.—Brinkmann Instruments, Inc., 115 Cutter Mill Rd., Great Neck, N. Y.

CIRCLE 298 ON READER-SERVICE CARD

**MEDICAL TERMS.** 32-page Word Book presents a "short cut to an understanding of medical and surgical terminology." Spanish version available also.—Birtcher Corp., 4371 Valley Blvd., Los Angeles 32, Calif.

CIRCLE 299 ON READER-SERVICE CARD

**ULTRASONIC CLEANING.** 2-page brochure describes transistorized 20-kc line of ultrasonic cleaning systems.—Acoustica Associates, Inc., 10400 Aviation Blvd., Los Angeles, Calif.

CIRCLE 300 ON READER-SERVICE CARD

**ZONE COMPARATORS.** Bulletin describes TCI device for plate diffusion assays of antibiotics.—Henley & Co., Inc., 202 E. 44 St., New York 17, N. Y.

CIRCLE 301 ON READER-SERVICE CARD

**CHEMICALS.** 212-page Catalog 61M lists and prices organic chemicals and reagents.—Chicago Apparatus Co., 1735 N. Ashland Ave., Chicago 22, Ill.

CIRCLE 302 ON READER-SERVICE CARD

**MICROPROBE.** 4-page bulletin describes EMX Electron Microprobe X-ray Analyzer for spectrographic applications.—Applied Research Laboratories, Inc., Bausch & Lomb Optical Co., Box 1710, Glendale 5, California.

CIRCLE 303 ON READER-SERVICE CARD

**MEDICAL PHOTOGRAPHS.** Kit of brochures and reprints describe uses and advantages of LogEtronic Contact Printers and Enlargers for X-rays, photographs, based on use of cathode ray tube technique; bibliography and price list included.—LogEtronic, Inc., 500 E. Monroe Ave., Alexandria, Va.

CIRCLE 304 ON READER-SERVICE CARD

**ELECTRON MICROSCOPY.** 14-page Supplement A describes techniques, fixative, embeddings, sectioning epoxy and polyester embedding blocks, staining, histochemistry.—Ivan Sorvall, Inc., Norwalk, Conn.

CIRCLE 305 ON READER-SERVICE CARD

**PNEUMATIC TRANSFER SYSTEM.** Data sheet describes Model 1401 FlexoRabbit plastic pneumatic transfer system designed to transport samples to and from sources of activating particles.—Radiation Equipment and Accessories Corp., 665 Merrick Rd., Lynbrook, N. Y.

CIRCLE 306 ON READER-SERVICE CARD

**CAMERA.** Brochure and price list describe Kodak Startech and accessories that allow use for medical and dental photography, X-ray copying, etc.—Lester A. Dine Co., 102 Jericho Turnpike, Floral Park, N. Y.

CIRCLE 307 ON READER-SERVICE CARD

**MICROSCOPES.** 4-page brochure describes medical and lab microscopes and accessories.—Sanders Laboratories, 83 Uhlard St., East Rutherford, N. J.

CIRCLE 308 ON READER-SERVICE CARD

**CHROMATOGRAPHY.** Data sheet details Gordon-Misco multiple tube chromatography laboratory for 1-dimensional ascending and descending paper strip chromatography.—Microchemical Specialties Co., 1825 Eastshore Hwy., Berkeley 10, Calif.

CIRCLE 309 ON READER-SERVICE CARD

**ELECTROPHORESIS.** Data sheet presents Kirk Micro Spectrolator for continuous-flow electrophoresis.—Microchemical Specialties Co., 1825 Eastshore Hwy., Berkeley 10, Calif.

CIRCLE 310 ON READER-SERVICE CARD

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collects directly into test tube racks



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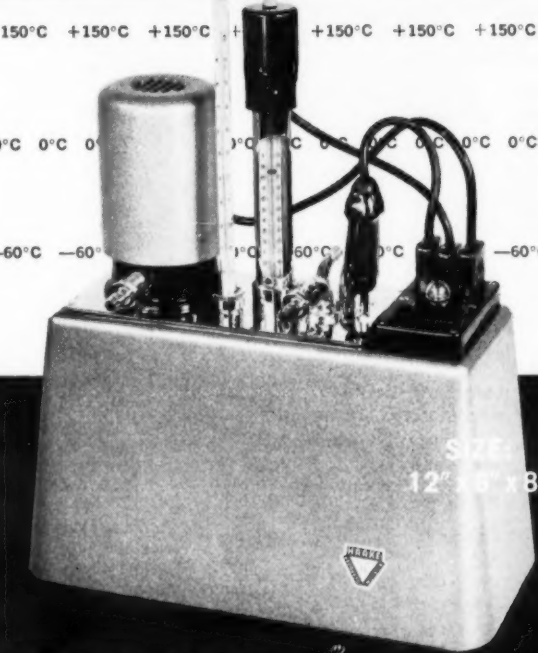
The racks themselves, with all the test tubes in the order collected, may be removed from the fractionator for further processing.

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CIRCLE 34 ON READER-SERVICE CARD

**RADIOACTIVE ISOTOPES.** 32-page manual, "Analytical Procedures with Radioactive Isotopes," is a collection of papers on practical isotope procedures.—Nuclear-Chicago Corp., 359 E. Howard Ave., Des Plaines, Ill.

CIRCLE 311 ON READER-SERVICE CARD

**RADIOACTIVITY.** Circular LL-1 describes new low-level radioactivity services.—Hazelton Nuclear Science Corp., 4062 Fabian Way, Palo Alto, Calif.

CIRCLE 312 ON READER-SERVICE CARD

**LABELLED COMPOUNDS.** Catalog Sheet describes new mock iodine source set for calibrating medical equipment measurement of iodine-131, and other labeled compounds.—Hazelton Nuclear Science Corp., 4062 Fabian Way, Palo Alto, Calif.

CIRCLE 313 ON READER-SERVICE CARD

**ELECTRON MICROANALYZER.** 4-page bulletin describes new DEM 301 Decimicron Electron Microanalyzer for electron microanalysis.—Elion Instruments Inc., 430 Buckley St., Bristol, Pa.

CIRCLE 314 ON READER-SERVICE CARD

**ELECTRODES.** Data sheet describes hand-held electrodes for electrotherapy.—Offner Div., Beckman Instruments Inc., 3900 River Rd., Schiller Park, Ill.

CIRCLE 315 ON READER-SERVICE CARD

**MONOCHROMATORS.** Bulletin 811R and price list detail Grating Monochromators that yield monochromatic illumination at any wavelength between 220 and 2,800 millimicrons in ultraviolet visible and infrared regions, using sources such as the H3, H4, H6, mercury arcs, etc.—Farrand Optical Co., Inc., Bronx Blvd. and E. 238 St., New York 70, N. Y.

CIRCLE 316 ON READER-SERVICE CARD

**MUSCLE STIMULATOR.** Bulletin describes Heikalator that provides stimulation by means of electric contact switch in the heel; a toe switch; a mercury switch activated by arm, leg, facial muscles.—Heinicke Instruments, 2035 Harding St., Hollywood, Fla.

CIRCLE 317 ON READER-SERVICE CARD

**OPTICS.** Technical Bulletin details laser crystals, components, and accessories.—Isomet Corp., 433 Commercial Ave., Palisades Park, N. J.

CIRCLE 318 ON READER-SERVICE CARD

**RADIATION MATERIALS.** Data sheets describe SCRAM I (Self-Contained Radiation Monitor), pen-type dosimeter which provides audible indication of radiation intensity, reference sources, low background flow counter.—Radiation Equipment and Accessories Corp., 665 Merrick Rd., Lynbrook, N. Y.

CIRCLE 319 ON READER-SERVICE CARD

**SERUM TRANSAMINASE.** 12-page booklet discusses colorimetric determination of SGO-T and SGP-T.—Scientific Products, Div. of American Hospital Supply Corp., Evanston, Ill.

CIRCLE 320 ON READER-SERVICE CARD

**CLINICAL CHEMISTRY.** 16-page booklet considers standards, controls, and calculations.—Scientific Products, Div. American Hospital Supply Corp., Evanston, Ill.

CIRCLE 321 ON READER-SERVICE CARD

**TRITIUM MONITOR.** Data sheet describes Model H598 with alarm, compensated detection chamber, dust filter and ion precipitator.—Radiation Technology, Inc., 657 Antone St., NW, Atlanta 18, Ga.

CIRCLE 322 ON READER-SERVICE CARD

**LAB RECORDER.** Data sheet describes Model 81 dual-channel, multiple absolute, and variable sensitivity recorder.—Yellow Springs Instrument Co., Inc., Yellow Springs, Ohio.

CIRCLE 323 ON READER-SERVICE CARD

**LAB SUPPLIES.** News sheet presents vacuum evaporator, heat-control, stirrer, glassware, etc.—J & H Berge Inc., 145 Hudson St., New York 13, N. Y.

CIRCLE 324 ON READER-SERVICE CARD

**PLASTIC PHOSPHOR.** Data sheet describes properties and stock forms of SC-700.—Crystals Div., Isotopes, Inc., 125 Woodland Ave., Westwood, N. J.

CIRCLE 325 ON READER-SERVICE CARD

**SERUM CONTROLS.** 10-page brochure describes Lab-Trol and PathoTrol for laboratory control of blood chemistry determinations.—Scientific Products, Div. American Hospital Supply Corp., Evanston, Ill.

CIRCLE 326 ON READER-SERVICE CARD

**COAGULATION PROCEDURES.** 26-page booklet discusses coagulation mechanism and diagnostic procedures.—Scientific Products, Div. American Hospital Supply Corp., Evanston, Ill.

CIRCLE 327 ON READER-SERVICE CARD

**LAB CARTS.** Brochure presents stainless steel carts, platform trucks, dollies.—J & H Berge, Inc., 145 Hudson St., New York 13, N. Y.

CIRCLE 328 ON READER-SERVICE CARD

**CINE-MICROPHOTOGRAPHY.** Bulletin reports on high-speed synchronized Strobe-Light and Micro-Illuminator.—Sanders Laboratories, East Rutherford, N. J.

CIRCLE 329 ON READER-SERVICE CARD

**DISTILLED WATER.** Bulletin 171 describes 25-gal, ultra-violet equipped, distilled water storage tank.—Barnstead Still And Sterilizer Co., 2 Lanesville Terrace, Boston 31, Mass.

CIRCLE 330 ON READER-SERVICE CARD

**BLOOD STUDIES.** Brochure describes Lab-Vis that measures liquid viscosity, is useful in blood coagulation studies.—Bendix Corp., Cincinnati Div., 3130 Wasson Rd., Cincinnati 8, Ohio.

CIRCLE 331 ON READER-SERVICE CARD

**CO. ANALYSIS.** 8-page methodology report describes procedure for automatic, continuous determination of CO<sub>2</sub> in biological fluids using as little as 0.05-ml specimen.—Technicon Instruments Corp., Chauncey, N. Y.

CIRCLE 332 ON READER-SERVICE CARD

**ELECTROCARDIOGRAPH ACCESSORIES.** 4-page List 179 describes electrodes, electrode jelly, record mounts, trolleys.—Cambridge Instrument Co., Ltd., (A. T. Germano), Graybar Bldg., 420 Lexington Ave., New York 17, N. Y.

CIRCLE 333 ON READER-SERVICE CARD

**DYE-DILUTION RECORDER.** 10-page List 326/2 describes Mark II Recorder for detecting and diagnosing structural functional disorders of the heart.—Cambridge Instrument Co., Ltd., (A. T. Germano), Graybar Bldg., 420 Lexington Ave., New York 17, N. Y.

CIRCLE 334 ON READER-SERVICE CARD

**ULTRA-MICROTOME.** 12-page catalog details principle, operation, and components of Huxley Ultra-microtome.—Cambridge Instrument Co., Ltd., (A. T. Germano), Graybar Bldg., 420 Lexington Ave., New York 17, N. Y.

CIRCLE 335 ON READER-SERVICE CARD

**EGG VIA PHONE.** 4-page bulletin presents Phonatrace for transmission of electrocardiograms via regular telephone lines.—Birtcher Corp., 4371 Valley Blvd., Los Angeles 32, Calif.

CIRCLE 336 ON READER-SERVICE CARD

**O<sub>2</sub> MONITOR.** 4-page Bulletin MID-1 describes Model 102 Monitor for *in vivo* and *in vitro* measurement of pO<sub>2</sub>.—Trans-tronic Systems, Ward Laboratories, 747 E. Markham Ave., Durham, N. C.

CIRCLE 337 ON READER-SERVICE CARD

**BLOOD HEAT EXCHANGER.** 16-page bulletin describes Brown-Harrison apparatus for use with heart-lung machines during extracorporeal by-pass.—Ward Laboratories, 747 E. Markham Ave., Durham, N. C.

CIRCLE 338 ON READER-SERVICE CARD

**FRACTION COLLECTING.** 6-page Bulletin 3-4000 explains principles of fraction collecting, and diagrams applications of instruments and accessories.—Buchler Instruments, Inc., 514 W. 147 St., New York 31, N. Y.

CIRCLE 339 ON READER-SERVICE CARD

**BALISTOCARDIOGRAPH.** 58-page Manual reviews cardiobalistic techniques and parameters, state of art, and development of Astro-Space balistocardiograph.—Medical Electronics Div., Astro-Space Laboratories, Inc., Huntsville, Ala.

CIRCLE 340 ON READER-SERVICE CARD

**OPHTHALMIC ARTERY PRESSURE.** Data Sheet 315-1 describes Pulsensor that provides quantitative physiological data for study of cerebral circulatory effects of hypertension, carotid blocks, collateral circulation, drugs, physiological and emotional stress, etc.—Decker Corp., Bala-Cynwyd, Pa.

CIRCLE 341 ON READER-SERVICE CARD

**SPIROMETER.** Data Sheet describes Model 130 Computing Spirometer that provides instant, accurate evaluations of maximum breathing capacity, vital capacity, and timed vital capacity.—Gilford Instrument Laboratories, Inc., Oberlin, Ohio.

CIRCLE 342 ON READER-SERVICE CARD

**ELECTROPHORESIS. CHROMATOGRAPHY.** New bulletin describes Uvicord Ultraviolet Absorptiometer, Conductolyzer, and Recorder for use "in-system" or independently.—LKB Instruments, Inc., 4840 Rugby Ave., Washington 14, D. C.

CIRCLE 343 ON READER-SERVICE CARD

**TITRATION.** 6-page Bulletin D describes Recording Titrator with dual, motor-driven titrating assemblies, multiple direct reading pH and mv ranges, automatic rate sensing and adjusting system.—E. H. Sargent & Co., Dept. RT, 4647 W. Foster Ave., Chicago 30, Ill.

CIRCLE 345 ON READER-SERVICE CARD

**BLOOD FLOW.** 4-page Bulletin F102 describes Microflo Blood Flowmeter and Flo-Probes that use electromagnetic gated sine-wave principle to determine blood flow in exposed, intact blood vessels.—Medicon, 3700 S. Broadway, Los Angeles 7, Calif.

CIRCLE 346 ON READER-SERVICE CARD

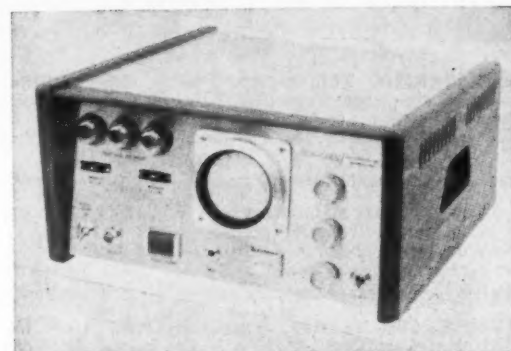
**RESPIRATORS.** Two 4-page brochures describe Mark 7 and Mark 8 instruments, latter with negative pressure gradient.—Bird Oxygen Breathing Equipment Inc., 218 Fremont, San Francisco 5, Calif.

CIRCLE 347 ON READER-SERVICE CARD

**PHOTOELECTRIC MEASUREMENT.** 6-page Condensed Bulletin 100 describes instruments for pH, colorimetry, fluorimetry, turbidimetry, photometry, etc.—Photovolt Corp., 95 Madison Ave., New York 16, N. Y.

CIRCLE 348 ON READER-SERVICE CARD

## Cardiac Monitor

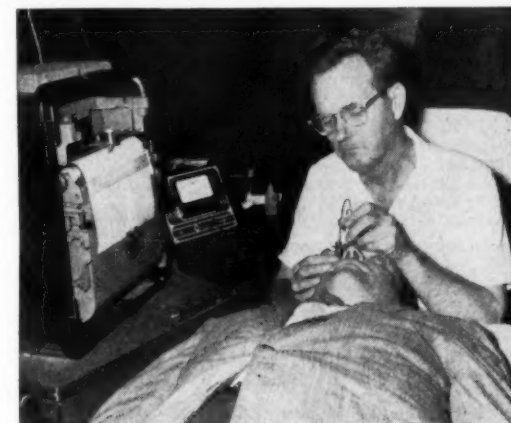


The Guardian uses the digital technique to count and numerically display heart rate three times each minute. It also permits continuous display of the electrocardiogram simultaneously. The instrument includes a dual warning device which is automatically actuated when the patient's heart rate moves beyond tolerances set by the physician . . . The low range is from 40 to 80 and the high from 80 to 120 beats per minute . . . The Guardian may be used in conjunction with Telemedics RKG radio-electrocardiograph systems or with connective wiring from the patient directly to the Guardian . . . Located at a nurses station, it can be adapted to sample several patients (consecutively) who are located in different rooms . . . (From one of three new bulletins, Telemedics Inc., Southampton, Pa.)

FOR THIS LITERATURE CIRCLE 349 ON READER-SERVICE CARD

## Glaucoma Detection

ST. LOUIS, MO.—Clinician W. A. Moore, Head of Instrumentation at Washington University's School of Medicine, uses a tonometer-recorder combination to detect and measure glaucoma. The tonometer's sensing trans-



ducer, a thin flat disc, presses against the eyeball; pressure and flow conditions within the eye are indicated on a Leeds & Northrup Speedomax G Recorder. A diagonal line indicates the healthy eye's adjustment to pressure changes; a straight line indicates glaucoma. The whole process takes about 30 seconds and gives accurate, permanent records. Tonometers used are manufactured by:

V. Mueller, Subs. American Hospital Supply Corp., 2020 Ridge Ave., Evanston, Ill.

CIRCLE 350 ON READER-SERVICE CARD

Crescent Engineering & Research Co., 5440 Peck Rd., El Monte, Calif.

CIRCLE 351 ON READER-SERVICE CARD

For more information on Speedomax G Recorder (Leeds & Northrup Co., 4901 Stenton Ave., Phila. 44, Pa.)

CIRCLE 352 ON READER-SERVICE CARD

## Medical Applications of Vacuum Cleaner Motors

KENT, OHIO—The Lamb Electric Co. of Kent, Ohio, Division of American Machine and Metals, Inc., suppliers of fractional horsepower electric motors, is constantly being asked for motors for unusual health applications. Modified vacuum cleaner motor types often serve the purpose. For example, a special vacuum cleaner motor with low voltage to permit operation by a battery pack or 12-volt car battery if necessary, provides alternate pressure and vacuum within a plastic shell strapped over the chest of a polio patient, thus creating a portable polio respirator in place of an iron lung. A three-stage version of the vacuum motor is used by a California firm in another plastic shell device which encases the torso of the patient to furnish alternating pressure and vacuum which forces blood to circulate to the extremities. Similarly, by providing alternate pressure and vacuum, a vacuum motor powers a device which helps minimize labor pains. A vacuum motor forces chemically treated air into a face mask on a pulmonary emphysema patient. In hydrotherapy a vacuum cleaner motor is placed outside the bathtub and blows warm air through perforated tubing placed in the warm water, thus creating warm circulating water.

CIRCLE 344 ON READER-SERVICE CARD



## American Heart Association Sessions

MIAMI BEACH, FLA.—The 34th Annual Scientific Sessions of the American Heart Association were held at the Americana Hotel, Miami Beach, Florida, October 20-24, 1961. 165 papers were presented, many of which described electronic instruments and other apparatus for measurement, recording and analysis of blood flows, pressures, electrocardiographic signals, cardiachometry, etc. Others covered perfusion apparatus and aids to heart surgery. There was great interest in the many equipments now available for transmission and telemetering of physiologic data via telephone and radio (such as the Mnemotron equipment for transmitting retinograms and other variables over telephone lines, the Telemedics equipment for transmitting cardiographic data via FM radio, the Birtcher equipment for transmitting electrocardiogram over a telephone, the Dallons equipment for telemetering physiological data, etc.). The exhibits included:

**AMERICAN OPTICAL CO.** (Instrument Div., Eggert and Sugar Rds., Buffalo, N. Y.) presented AO Cardiometer; Cardiachometer-Pacemaker unit which monitors patient audibly and visually, and displays continuous electrocardiogram.

CIRCLE 353 ON READER-SERVICE CARD

**ASTRO-SPACE LABORATORIES, INC.** (Huntsville, Ala.) featured air-bearing-supported ballistocardiograph with appropriate recorder.

CIRCLE 354 ON READER-SERVICE CARD

**C. R. BARD, INC.** (Summit, N. J.) exhibited new Bard-DeBakey Dacron Arterial Grafts, Teflon Prostheses for surgery, and Bard catheters for extracorporeal systems.

CIRCLE 355 ON READER-SERVICE CARD

**BECKMAN INSTRUMENTS, INC.** (1117 California Ave., Palo Alto, Calif.) exhibited catheter for measuring intracardiac  $PO_2$ , continuous systolic blood pressure monitor, and alveolar  $CO_2$  and  $N_2O$  analyzer.

CIRCLE 356 ON READER-SERVICE CARD

**BIRTCHER CORP.** (4373 Valley Blvd., Los Angeles, Calif.) featured Phonatrace system whereby patient's ECG can be recorded at one location while simultaneously transmitting trace, via telephone, anywhere in country for interpretation and consultation. Other products displayed, 3 ECG Models, plus cardiac monitoring and resuscitation equipment.

CIRCLE 357 ON READER-SERVICE CARD

**BURDICK CORP.** (Milton, Wis.) exhibited electrocardiographic equipment, including EK-III Electrocardiograph and EK-47 Console Stand.

CIRCLE 358 ON READER-SERVICE CARD

**BOWEN & CO.,** (Box 5818-T, Bethesda, Md.) exhibited Welsh Electrodes, Krasno-Graybiel Plastrodes, Howell Electrodes, Ballistocardiograph, QT Calculator, Alcohol Dispenser, and 20X Magnifier.

CIRCLE 359 ON READER-SERVICE CARD

**CAMBRIDGE INSTRUMENT CO.,** (420 Lexington Ave., New York, N. Y.) exhibited multichannel units for recording and monitoring physiologic and biophysical phenomena; VersaScribe portable electrocardiograph; explosion-proof operating-room cardiograph; Audio-Visual Heart Sound Recorder used in the study of the teaching of auscultation; Research pH Meter; Pulmonary-Function Tester; Gamma-Ray Pocket Dosimeters; and Dye-Dilution Recorder.

CIRCLE 360 ON READER-SERVICE CARD

**CAROLINA MEDICAL ELECTRONICS, INC.,** (Winston Salem, N. C.) in cooperation with the Electromagnetic Probe Co., exhibited Square-Wave Electromagnetic Flowmeter and Probes (of various designs) for direct measurement of blood flow in unopened, but surgically exposed, vessels and in extracorporeal circuits.

CIRCLE 361 ON READER-SERVICE CARD

**CORBIN-FARNSWORTH, INC.,** (440 Page Mill Rd., Palo Alto, Calif.) exhibited Morris External Defibrillator; new Scopette, portable Cardioscope; Life Guard, new concept in intensive care and recovery-room monitoring; new Morris Automatic Pacemaker for monitoring and pacemaking; and new Strain-Gage Valve to simplify blood pressure monitoring.

CIRCLE 362 ON READER-SERVICE CARD

**CORDIS CORP.,** (241 N.E. 36 St., Miami, Fla.) exhibited intercalative Angiograph for ECG programmed dye injection and triggered X-ray exposure containing the following independently constructed but integrated modules: Cardiac Programmer, Injector, X-ray, Trigger, and Two-Channel Recorder. Alternating Tourniquet restricts alternately, in a uniform fashion, venous return from limbs.

CIRCLE 363 ON READER-SERVICE CARD

**DALLONS LABORATORIES, INC.** (5066 Santa Monica Blvd., Los Angeles, Calif.) exhibited complete line of apparatus for cardiovascular studies, monitoring devices for operating room, and central monitoring systems for intensive care facilities; also Physiotel telemetering system, demonstrated in vivo.

CIRCLE 364 ON READER-SERVICE CARD

**ELECTRODYNE CO., INC.** (Norwood, Mass.) presented new combination Pacemaker-Alarm Monitor and 5" Electrocardiograph; 2 Micro-Miniature Cardiac Pacemakers.

CIRCLE 365 ON READER-SERVICE CARD

**ELECTRONICS FOR MEDICINE, INC.** (30 Virginia Rd., White Plains, N. Y.) exhibited 4-channel unit for ECG, phonocardiograms, vectorcardiograms, and pulmonary function leads; large screen monitor, used as repeater or self-contained units; surgical and intensive care systems.

CIRCLE 366 ON READER-SERVICE CARD

**FOREGGER COMPANY, INC.** (Roslyn Heights, L. I., N. Y.) exhibited Pulspirator, heart-lung oxygenator of bubble type used in more than 150 clinical procedures.

CIRCLE 367 ON READER-SERVICE CARD

**GILFORD INSTRUMENT LABORATORIES** (Oberlin, Ohio) displayed new recording system for qualitative dye-curve inscription from an earpiece and a dye-curve extrapolator and area-computing system, densitometer/oximeter systems, spirometers, cardiachometers, and blood-pressure-recording apparatus.

CIRCLE 368 ON READER-SERVICE CARD

Continued on page 30

**SOUND MEASUREMENT.** 4-page brochure and data sheets describe sound level meters, sound analyzer, calibrator, alarm.—H. H. Scott, Inc., Instrument Div., 111 Powdermill Rd., Maynard, Mass.

CIRCLE 369 ON READER-SERVICE CARD

**PNEUMATIC TUBE SYSTEM.** 4-page Circular 384 describes Grover Pneumatic Tube Systems for despatching hospital records, charts, medicines to pre-selected destinations.—Powers Regulator Co., Dept. IA-5, Skokie, Ill.

CIRCLE 370 ON READER-SERVICE CARD

**LAB INSTRUMENTS.** 72-page Booklet 62 includes Models MR and SR Laboratory Recorders, Models XV and XXI Polarographs, Model D Recording Titrator, etc.—E. H. Sargent & Co., Dept. 62, 4647 W. Foster Ave., Chicago 30, Ill.

CIRCLE 371 ON READER-SERVICE CARD

**IR ANALYSIS.** 4-page Application Data Sheet IR-8074-M, "Renal and Bladder Calculi Identification through Infrared Analysis," describes use of Beckman IR-5 Infrared Spectrophotometer in analyzing and identifying kidney and bladder stones.—Scientific and Process Instruments Div. Beckman Instruments, Inc., Fullerton, Calif.

CIRCLE 372 ON READER-SERVICE CARD

**LABELED COMPOUNDS.** 50-page catalog presents "largest line" of isotopic labeled compounds.—Niche Inc., Box 5737, Bethesda 14, Md.

CIRCLE 373 ON READER-SERVICE CARD

**ULTRASONIC THERAPY.** 4-page brochure describes Sonicator which incorporates "lightest transducer yet developed."—Mettler Electronics Corp., 114 W. Holly St., Pasadena, Calif.

CIRCLE 374 ON READER-SERVICE CARD

**ELECTRO-MEDICAL INSTRUMENTS.** 4-page Bulletin describes oximeters, densitometers, cardiachometer, nitrogen gas analyzer, thermistor thermometers, etc.—Waters Corp., Box 529, Rochester, Minn.

CIRCLE 375 ON READER-SERVICE CARD

**MICROTOME-CRYOSTAT.** 8-page Bulletin WC describes Model CT simple, compact cryostat with microtome mounted in stainless steel cold chamber for accurate tissue sectioning work.—International Equipment Co., 1284 Soldiers Field Rd., Boston 35, Mass.

CIRCLE 376 ON READER-SERVICE CARD

**SPECTROPHOTOMETRY.** 2 new bulletins describe Model 220 Absorbance Indicator and Model 205 hydrogen & tungsten Light Source Stabilizer for use with precision laboratory spectrophotometers.—Gilford Instrument Laboratories, Inc., Oberlin, Ohio.

CIRCLE 377 ON READER-SERVICE CARD

**CARDIAC RESUSCITATOR.** 4-page bulletin describes synchronous electrocardiac massage machine for closed-chest cardiac massage.—Hallikainen Instruments, Slaco Div., 1341 Seventh St., Berkeley 10, Calif.

CIRCLE 378 ON READER-SERVICE CARD

**CHROMATOGRAM SCANNER.** 4-page bulletin describes Scanogator automatic windowless integrating scanner for counting tritium, carbon-14 and sulphur-35.—Atomic Accessories Inc., Subs. Baird-Atomic Inc., 811 W. Merriken Rd., Valley Stream, N. Y.

CIRCLE 379 ON READER-SERVICE CARD

**BALANCES.** 4-page Bulletin 659 describes Right-A-Weigh Analytical Balance featuring speed, accuracy, and digital readout.—Wm. Ainsworth & Sons, Inc., 2151 Lawrence St., Denver 5, Colo.

CIRCLE 380 ON READER-SERVICE CARD

**GAS CHROMATOGRAPHY.** New Bulletin F-10195 presents Argon Ionization Detectors for detecting radium, strontium-90, and tritium.—Barber-Colman Co., Industrial Instruments Div., Rockford, Ill.

CIRCLE 381 ON READER-SERVICE CARD

**LAB INSTRUMENTS.** 72-page Catalog 60G includes instruments for analytical chemistry, biological labs, shakers, stirrers, pumps, etc.—Eberbach Corp., Box 1024, Ann Arbor, Mich.

CIRCLE 382 ON READER-SERVICE CARD

**UNIFORM FLOW PUMP.** New data sheet gives preliminary specs on new model pumps that produce uniform flow and permit precise control.—Sage Instruments, Inc., 9 Bank St., White Plains, N. Y.

CIRCLE 383 ON READER-SERVICE CARD

**CINEPHOTOMICROGRAPHY.** 4-page bulletin describes apparatus for time lapse cinephotomicrography of living materials at high magnification.—Sage Instruments, Inc., 9 Bank St., White Plains, N. Y.

CIRCLE 384 ON READER-SERVICE CARD

**THIN LAYER CHROMATOGRAPHY.** 8-page brochure presents principle and apparatus for rapid adsorption microchromatographic method.—Brinkmann Instruments, Inc., 115 Cutter Mill Rd., Great Neck, N. Y.

CIRCLE 385 ON READER-SERVICE CARD



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CIRCLE 35 ON READER-SERVICE CARD

**TELEMETRY.** 4-page bulletin introduces acoustical system with undersea bio-medical data transmission applications.—Bendix-Pacific Div., Bendix Corp., North Hollywood, Calif.

CIRCLE 386 ON READER-SERVICE CARD

**CAUDAL PLETHYSMOGRAPH.** Data Sheet 320-1 describes animal pulse rate and blood pressure monitoring system.—Decker Corp., Bala-Cynwyd, Pa.

CIRCLE 387 ON READER-SERVICE CARD

**BAR CHART RECORDER.** 8-page Bulletin IC 6150 describes Series 1200 Recorder that monitors 1 to 40 or even 200 machines or operations on a single 12" by 20" chart.—Electronic Associates, Inc., Long Branch, N. J.

CIRCLE 388 ON READER-SERVICE CARD

**CATHETERS.** Brochure describes Polyethylene catheters and drainage tubes.—American Cystoscope Makers, Inc., 1241 Lafayette Ave., New York 59, N. Y.

CIRCLE 389 ON READER-SERVICE CARD

**CHROMATOGRAPHY.** 4-page Bulletin 3-6000 describes Varigrad apparatus for producing reproducible gradients.—Buchler Instruments Inc., 514 W. 147 St., New York 31, N. Y.

CIRCLE 390 ON READER-SERVICE CARD

**PLASTIC LAB APPARATUS.** 24-page Catalog J-1060 describes Nalgene polyolefin bottles, beakers, funnels, etc.—Gardner Laboratory, Inc., 5521 Landy Lane, Box 5728, Bethesda 14, Md.

CIRCLE 391 ON READER-SERVICE CARD

**BLOOD ANALYSIS.** Series of data sheets describe Natelson Microgasometer, shakers, timers, rotator, pipettes, etc.—Scientific Industries, Inc., 15 Park St., Springfield 3, Mass.

CIRCLE 398 ON READER-SERVICE CARD

**ELECTRON MICROSCOPES.** 8-page bulletin describes Type HS-6, and 16-page bulletin describes Type HU-11 Hitachi instruments.—Erb & Gray Scientific, Inc., 5927 Riverdale Ave., New York 71, N. Y.

CIRCLE 399 ON READER-SERVICE CARD

**ELECTRON MICROSCOPES.** 24-page Bulletin FS-240 describes microscopes of 600 to 200,000X.—Fisher Scientific, 711 Forbes Ave., Pittsburgh 19, Pa.

CIRCLE 400 ON READER-SERVICE CARD

**ELECTRON MICROSCOPE.** 6-page Folder EM-200 describes new Electron Microscope.—Philips Electronic Instruments, 750 S. Fulton Ave., Mount Vernon, N. Y.

CIRCLE 401 ON READER-SERVICE CARD

**MICROSCOPES.** 10-page booklet presents binocular and monocular Elgeet-Olympus microscopes.—Elgeet Optical Co., Inc., 838 Smith St., Rochester 6, N. Y.

CIRCLE 402 ON READER-SERVICE CARD

**ELECTRON MICROSCOPE.** 16-page booklet describes applications and operation of Tronscope TRS-50 E 1.—Bendix Aviation Corp., Cincinnati 8, Ohio.

CIRCLE 403 ON READER-SERVICE CARD

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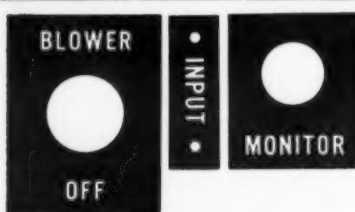
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CIRCLE 39 ON READER-SERVICE CARD

## NEW LITERATURE (continued)

**AEROSOL MEASUREMENT.** 24-page Bulletin BP-1000B describes Brice-Phoenix Light Scattering Photometer; 8-page Bulletin JM-1000C describes Sinclair-Phoenix unit for measuring, recording dust and smoke concentrations.—Phoenix Precision Instrument Co., 3803-05 N. 5 St., Phila. 40, Pa.

CIRCLE 411 ON READER-SERVICE CARD

**MICROTOME.** 8-page Bulletin GEF-160 describes Porter-Blum Ultra-Microtome for sectioning of materials for electron- and light-microscope investigation.—Ivan Sorvall, Inc., Norwalk, Conn.

CIRCLE 412 ON READER-SERVICE CARD

**EKG RECORDING.** Four brochures describe electronic equipment for detecting, recording, oscillograph display of heart and fetal heart activity.—Officine Galileo, c/o Mr. I. Frigerio, 2 W. 45 St., New York, N. Y.

CIRCLE 413 ON READER-SERVICE CARD

**VACUUM SYSTEMS.** Four bulletins detail pumping units, evaporators, furnaces, components, etc. for producing high vacuum in electronics.—Kinney Vacuum, Div. New York Air Brake Co., 3529 Washington St., Boston 30, Mass.

CIRCLE 414 ON READER-SERVICE CARD

**BLOOD FLOW.** 8-page Bulletin 10-14 describes Blood Flow Meter for extracorporeal circuits.—Foxboro Co., Foxboro, Mass.

CIRCLE 415 ON READER-SERVICE CARD

## CLEARING HOUSE

To assist—1. Organizations in need of personnel experienced in biomedical instrumentation and electronics.

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Unusual opportunity now exists for one electronic engineer who desires to work with a small, expanding, currently successful medical electronics manufacturer. Responsibilities will include design, production and testing with management of these functions as the long range objective. If you have ambition, organizational ability and want to earn a future in medical electronics,

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Vincent Siclari announces—after more than fourteen years successful sales-service record—termination of association as Representative for Sanborn Company, Medical Division. Free to accept assignments and/or consider business propositions, will invest. Based on great need and demand of loyal and excellent following, plan to remain allied to Medical and Life Sciences field on consultant basis, etc. Prestige built up on fine record, professional competence, integrity, dedication and matured background plus extensive contacts will be an asset to any concern and/or area. Primary objective to re-locate to Florida as climate (regular visitor) beneficial to ailing wife (R. A.) and son (congenital cardiac).

Write—Phone  
949-51st St., Brooklyn 19, N. Y.  
Gedney 6-4567

**HEMOGLOBIN MEASUREMENT.** 4-page Bulletin B-237 describes Model 25 Photo-Hemoglobinometer for chemical analysis of Hb content of measured blood sample.—Coleman Instruments, Inc., 318 Madison St., Maywood, Ill.

CIRCLE 416 ON READER-SERVICE CARD

**HEMOGLOBIN CONCENTRATION.** 2-page brochure describes Model 1000 Hb-Meter for determining hemoglobin concentration in blood by its optical properties.—American Optical Co., Instrument Div., Buffalo 15, N. Y.

CIRCLE 417 ON READER-SERVICE CARD

**MICRO-FORGE.** Brochure presents instrument to produce glass needles used for the injection of fruit fly larva.—Sanders Laboratories, East Rutherford, N. J.

CIRCLE 418 ON READER-SERVICE CARD

**OXYGEN ANALYSIS.** Brochure describes GP-10 Gas Phase Oxygen Transducer.—Chemtronics, Inc., Box 417, San Antonio, Texas.

CIRCLE 419 ON READER-SERVICE CARD

**AMINO ACID ANALYSIS.** 12-page Bulletin K-8000 and 4-page Bulletin VG-6000 describe Analyzers for separation, identification and quantitative analysis of amino compounds.—Phoenix Precision Instrument Co., 3803-05 N. Fifth St., Phila. 40, Pa.

CIRCLE 420 ON READER-SERVICE CARD

**PARTICLE COUNTER.** 4-page Bulletin A-2 describes Counter that determines number and size of particles suspended in electrically conductive liquid.—Coulter Industrial Sales Co., Div. Coulter Electronics Inc., 2525 N. Sheffield Ave., Chicago 14, Ill.

CIRCLE 421 ON READER-SERVICE CARD

**GAMMA COUNTER.** 4-page Bulletin AN6502 describes Model 250 Amplifier-Analyzer for gamma scintillation counting.—Baird-Atomic, Inc., 33 University Rd., Cambridge 38, Mass.

CIRCLE 422 ON READER-SERVICE CARD

**CLOSED CIRCUIT TV.** 10-page brochure describes how closed-circuit TV can be used in hospitals.—Electronics Div., Fairbanks Morse & Co., 100 Electra Lane, Yonkers, N. Y.

CIRCLE 423 ON READER-SERVICE CARD

**DC AMPLIFIER.** 22-page booklet and 2-page data sheet describe DA-12 DC Amplifier with min. 1-megohm input, max. 15-ohms output.—United Electro-Dynamics, Inc., 200 Allendale Rd., Pasadena, Calif.

CIRCLE 424 ON READER-SERVICE CARD

**INFRARED SAMPLING.** 4-page bulletin explains principles of Attenuated Total Reflection technique and strongly absorbing liquids.—Connecticut Instrument Corp., Wilton, Conn.

CIRCLE 425 ON READER-SERVICE CARD

**ULTRASONIC DISINTEGRATOR.** 4-page brochure describes components and principles of MSE Ultrasonic Disintegrator in preparation of antigenically active extracts from biological material, in preparation of D.N.A., and in study of enzyme systems and intracellular morphology.—Instrumentation Associates, 17 W. 60 St., New York 23, N. Y.

CIRCLE 426 ON READER-SERVICE CARD

**ELECTROPHORESIS.** 12-page manual explains use of high-voltage paper electrophoresis tanks.—Servonuclear Corp., 28-21 Astoria Blvd., Long Island City 2, N. Y.

CIRCLE 427 ON READER-SERVICE CARD

**CHROMATOGRAPHY.** Data sheet presents LKB 500 MiniFlow Precision Micropump for chromatographic applications.—LKB Instruments, Inc., 4840 Rugby Ave., Washington 14, D.C.

CIRCLE 428 ON READER-SERVICE CARD

**MICRO SAMPLING.** Data Sheet 5A describes ultra-micro cavity cells.—Connecticut Instrument Corp., Wilton, Conn.

CIRCLE 429 ON READER-SERVICE CARD

**CHROMATOGRAPHY.** Data Sheet 7A describes CH-6A gas chromatographic fraction collector.—Connecticut Instrument Corp., Wilton, Conn.

CIRCLE 430 ON READER-SERVICE CARD

**TISSUE SPECIMENS.** Brochure explains technique of preparing and filing specimens with Tissue-Tek System.—Lab-Tek Plastics Co., Westmont, Ill.

CIRCLE 431 ON READER-SERVICE CARD

**THIN SECTIONING.** Data sheet describes Gillings-Bronwill machine that prepares dentine sections as thin as 35 microns, crystal sections as thin as 0.005" to 0.010".—Bronwill Scientific Div., Will Corp., Box 3927, Brighton Sta., Rochester 10, N. Y.

CIRCLE 432 ON READER-SERVICE CARD

**CELL DISRUPTION.** Data sheet describes Continuous Flow Biosonik that breaks down cellular material without enzyme inactivation.—Bronwill Scientific Div., Will Corp., Box 3927, Brighton Sta., Rochester 10, N. Y.

CIRCLE 433 ON READER-SERVICE CARD

**SURGICAL CAMERA.** Data sheet describes Model SC-10 Aseptic Automatic Camera.—Waters Corp., Electro-Medical Instrument Div., Rochester, Minn.

CIRCLE 434 ON READER-SERVICE CARD

**NITROGEN GAS ANALYZER.** Bulletin A-7/61 gives features and applications of Model A-7 for investigation of nitrogen content in respiratory gases in pulmonary function studies.—Waters Corp., Electro-Medical Instrument Div., Rochester, Minn.

CIRCLE 435 ON READER-SERVICE CARD

**OXIMETER.** Bulletin X-65/60 describes Model X-65 Oximeter for determining and monitoring blood oxygen saturation.—Waters Corp., Electro-Medical Instrument Div., Rochester, Minn.

CIRCLE 436 ON READER-SERVICE CARD

**DENSITOMETER.** 4-page bulletin describes Densicord Recording Electrophoresis Densitometer Model 542.—Photovolt Corp., 1115 Broadway, New York 10, N. Y.

CIRCLE 437 ON READER-SERVICE CARD

## AMERICAN HEART ASSOC. (continued)

**INSTRUMENTATION LABORATORY, INC.** (108 Cummington St., Boston, Mass.) demonstrated Blood Gas Analyzing Systems for measurements of pH, pCO<sub>2</sub> and pO<sub>2</sub>; thermal-regulated water bath for the electrode cuvettes, and 3 electrodes.

CIRCLE 438 ON READER-SERVICE CARD

**KELEKET X-RAY CORP.** (1601 Trapelo Rd., Waltham, Mass.) presented high-gain 9" image intensification system in conjunction with a Heart Catheterization Table and related accessories.

CIRCLE 439 ON READER-SERVICE CARD

**MED-SCIENCE ELECTRONICS, INC.** (formerly Custom Engr. and Devel. Co., 2646-49 Locust St., St. Louis, Mo.) displayed Mechanical Heart-Lung Apparatus, including Profound Hypothermia Machines, Intracardiac Sucker System, and Pump-Oxygenators; also Pulmonary Function Testing Equipment, consisting of Nitralyzers, Servo-Spirometers, Wedge Spirometers, and Data Optimizing Computer.

CIRCLE 440 ON READER-SERVICE CARD

**MEDTRONIC, INC.** (818 19 Ave. N.E., Minneapolis, Minn.) displayed cardiac pacemakers, defibrillators, and monitoring instruments; Electrocardiosync for controlled-dye injection; Conduction System Locator for locating the bundle of His, Cardiac Tachograph, Coagulation Generation, and Physiologic Stimulator.

CIRCLE 441 ON READER-SERVICE CARD

**MNEMOTRON CORP.** (45 S. Main St., Pearl River, N. Y.) exhibited multichannel precision analog data tape recording systems for recording physiologic variables; on-line digital average response computer, CAT Mark II for precise average retinograms and averaging of other biological variables over a standard telephone with no connection to line; new on-line auto and cross correlator.

CIRCLE 442 ON READER-SERVICE CARD

**NORTH AMERICAN PHILIPS CO., INC.** (100 E. 42 St., New York, N. Y.) featured pulsed image intensification systems with automatic brightness stabilization for cardioangiography in congenital and acquired heart disease. Compatible systems for fluoroscopy, cineradiography, and medical TV.

CIRCLE 443 ON READER-SERVICE CARD

**PICKER X-RAY CORP.** (23 S. Broadway, White Plains, N. Y.) showed cardiologic X-ray equipment, including image orthicon TV system.

CIRCLE 444 ON READER-SERVICE CARD

**SANBORN CO.** (Waltham, Mass.) exhibited instruments for biophysical research, recording systems (single- and multichannel, direct-writing, photographic, and tape), monitoring oscilloscopes, transducers (pressures, temperature, etc.), and new preamplifiers for a wide range of physiologic applications.

CIRCLE 445 ON READER-SERVICE CARD

**SCHICK X-RAY CO., INC.** (444 N. Lake Shore Dr., Chicago 11, Ill.) featured X-ray and electro-medical units; direct-writing jet recorders for ECG, phonocardiography, pressure etc.; film changers for angiography, high-pressure injection syringes, fluoroscopic tables for catheterization, also Engstrom respirator by Mivab.

CIRCLE 446 ON READER-SERVICE CARD

**SCHWARZER CO.** (Watertown, Mass.) presented their Cardioscript ST line, the direct-writing combination-recorders for phonocardiography (up to 1,000 cps in selective octave filters), ECG, ballistocardiography, pulse tracings, blood pressures, etc.; also portable Cardioscript 3 and new 10-channel large-screen Oscilloscope.

CIRCLE 447 ON READER-SERVICE CARD

**STATHAM INSTRUMENTS, INC.** (c/o Jess Burns, 20 Stern Ave., Springfield, N. J.) showed latest developments in miniaturization of unbonded strain-gage transducer for pressure and flow measurement.

CIRCLE 448 ON READER-SERVICE CARD

**TELEMEDICS, INC.** (Div. Vector Mfg. Co., Southampton, Pa.) showed the RKG 100 Radioelectrocardiograph, which broadcasts electrocardiograms (consists of a pocket-size, 10-oz. FM transmitter, 2 specially designed, easy-to-apply miniature electrodes, and a portable desk model FM radio receiver).

CIRCLE 449 ON READER-SERVICE CARD

**U.S. CATHETER & INSTRUMENT CORP.** (Bay St. & Homer, Glen Falls, N. Y.) showed cardiac catheters, electrodes, and tubing.

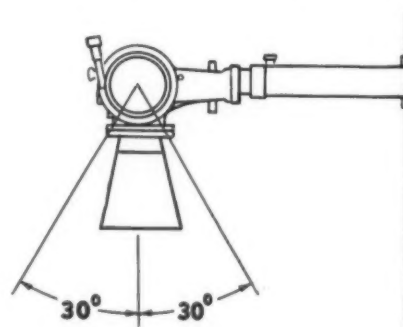
CIRCLE 450 ON READER-SERVICE CARD

**WATERS CORP.** (Rochester, Minn.) displayed linear flow insensitive blood densitometer, improved cuvette and ear oximeter, new low-cost nitrogen gas analyzer, automatic switching multiple-channel thermistor thermometer, oximeter recording system, and Cardiotachometer.

CIRCLE 451 ON READER-SERVICE CARD

## X-ray Tubestand

The Mattern Model 3 Floor-Ceiling Tubestand combines improved structural rigidity with smooth mobility to permit rapid, accurate positioning of even the heaviest X-ray tube. The new functional design features a box-



girder style vertical column to rigidly support the X-ray arm in all positions... Once the position is selected, an On-Off switch controls both the vertical and horizontal locks to positively retain the desired position during exposure... (From 4-page bulletin, one of a collection of 12, Mattern X-Ray, Div. Land-Air, Inc., 7444 W. Wilson Ave., Chicago 31, Ill.)

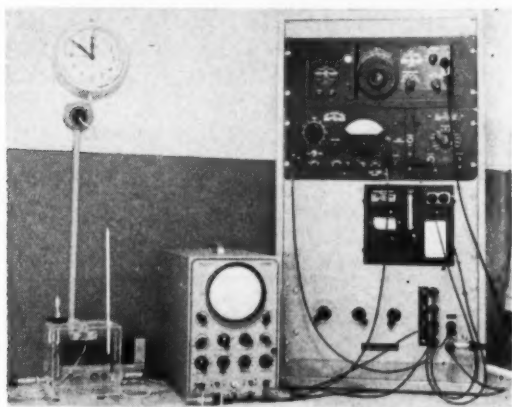
FOR THIS LITERATURE CIRCLE 452 ON READER-SERVICE CARD



## Dielectric Properties of Blood

**V**ARIOUS ATTEMPTS have been made to study the process of blood coagulation by determining changes occurring in its physical properties, i.e., variations in viscosity, elasticity, light transmission, and electrical conductivity. Preliminary tests of the variation of the dielectric properties of coagulating human blood indicated that significant changes in the properties occurred during coagulation.

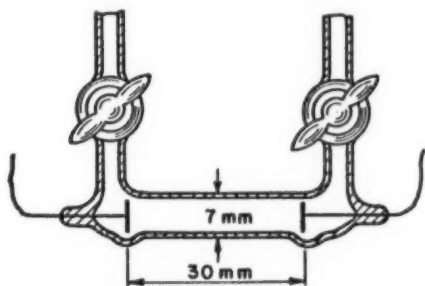
A measuring bridge was used to measure capacitance in the range of 5-100 pf, and resistance in the range 1000-4000 ohms, at a frequency of 100 kc. This frequency was chosen to overcome polarization effects. Fig. 1 shows the equipment setup; a typical



**FIG. 1. EQUIPMENT** used included capacitance resistance bridge, General Radio unit R-C oscillator type 1210-C with unit power supply 1203-B, General Radio amplifier with filter type 1231-BRFA, General Radio three-terminal precision condenser type 722-CB, Heath Kit oscilloscope, thermostat control.

pyrex cell used for the blood is shown in Fig. 2. The electrodes and leads are of platinum.

The bridge circuit used has two equal ratio arms formed by the two halves of the center-tapped secondary of a transformer, the primary of which is con-



**FIG. 2. PYREX CELL** used for blood samples.

nected to a 100-kc oscillator. The ratio arms are connected across the capacitance-resistance network used. The blood cell is connected across one of the fixed 100-pf capacitors and a calibrated variable capacitor is connected across the other. The resistance-divider network, consisting of a fixed 1000-ohm resistor and two ganged 100-ohm inductance-compensated resistance boxes, balances the resistive component of the blood impedance.

Blood was drawn from the vein in the donor's arm (using a syringe preheated to body temperature) and injected through a small hole in the top of the box into one filling arm of the cell (also at body temperature). The time at which the blood first entered the syringe was assumed to be the time at which coagulation started. Measurement of the electrical properties commenced as soon as the bridge could be balanced. This was within 1 minute from the time of withdrawal of the blood.

Measurements on over 60 blood samples (including those taken from normals, abnormals, and patients receiving medications) show that changes occur in the dielectric constant and resistivity of blood during coagulation. With further study, this method may prove to be of use in the study of blood coagulation and in the control of anticoagulant therapy.

Abstracted from a paper by Dr. A. G. Mungall and Dr. D. Morris, (Division of Applied Physics, National Research Council, Ottawa, Ontario) and Dr. W. S. Martin (Ste. Anne's Hospital, Ste. Anne de Bellevue, Quebec) presented at the Bio-Medical Electronics Sessions (June 1, 1960) jointly sponsored by the I.S.A. and the Montreal Chapter of the PGBME, and published in the IRE Transactions on Bio-Medical Electronics, Vol. BME-8, pp 109-111, April 1961.

FOR MORE INFORMATION ON GENERAL RADIO CO.  
CIRCLE 453 ON READER-SERVICE CARD  
FOR MORE INFORMATION ON HEATH CO.  
CIRCLE 454 ON READER-SERVICE CARD

**LABELED COMPOUNDS.** 8-page Catalog 587 lists isotopes for industry, research, medicine.—Isotopes Specialties Co., Div. of Nuclear Corp. of America, 170 W. Providencia, Box 688, Burbank, Calif.

CIRCLE 455 ON READER-SERVICE CARD

**ANESTHESIA SYSTEM VALVES.** Two data sheets describe Frumin Non-Rebreathing Valve Model 161 (new face valve for non-breathing systems), and Steen Pressure Equalizing Valve Model 185 (new anesthesia circuit element).—Invengineering, Inc., Box 360, Belmar, N. J.

CIRCLE 456 ON READER-SERVICE CARD

**LAB APPARATUS.** 16-page catalog lists precision pipettors, plate distillation apparatus, balances, incubators, etc.—Emil Greiner Co., 20 N. Moore St., New York 13, N. Y.

CIRCLE 457 ON READER-SERVICE CARD

**HEAD & X-RAY CASSETTE HOLDER.** Brochure describes positioning apparatus for neurosurgery and X-rays.—Invengineering, Inc., Box 360, Belmar, N. J.

CIRCLE 458 ON READER-SERVICE CARD

**PLASTIC LABWARE.** 20-page Catalog G lists disposable petri dishes, tubes, tissue culture containers, etc.—Falcon Plastics, Div. of B-D Laboratories, Inc., 5500 W. 83 St., Los Angeles 45, Calif.

CIRCLE 459 ON READER-SERVICE CARD

**ELECTROMYOGRAPHY.** Brochure describes apparatus for stimulating, diagnosing, and recording muscle activity.—EMG Associates, 20 E. 68 St., New York 21, N. Y.

CIRCLE 460 ON READER-SERVICE CARD

**PHYSIOLOGICAL APPARATUS.** 16-page catalog describes kymographs, recorders, electrodes, stimulators, timers, respiration and infusion pumps, etc.—Harvard Apparatus Co., Inc., Dover, Mass.

CIRCLE 461 ON READER-SERVICE CARD

**TISSUE PROCESSING.** 8-page brochure explains components and advantages of new equipment.—Lipshaw Mfg. Co., 7446 Central Ave., Detroit 10, Mich.

CIRCLE 462 ON READER-SERVICE CARD

**ULTRASONIC CLEANER.** Two brochures describe DiSONtegrator cleaners.—Federal Scientific Co., Inc., 10421 Metropolitan Ave., Kensington, Md.

CIRCLE 463 ON READER-SERVICE CARD

**ANIMAL BLOOD PRODUCTS.** 16-page Price List includes tissue culture reagents, diagnostic reagents, and diagnostic antigens and antisera.—Cappel Laboratories, Div. B-D Labs., Inc., West Chester, Pa.

CIRCLE 464 ON READER-SERVICE CARD

**FRACTIONATOR.** Data sheet presents EC520 Countercurrent Fractionator with 100-tube extraction train.—E-C Apparatus Co., 538 Walnut Lane, Swarthmore, Pa.

CIRCLE 465 ON READER-SERVICE CARD

**DATA RECORDING.** Brochures describe Magnetic Tape Data Recording System and SAGA graphic recorder.—Electro-Med-Dyne Inc., 60 Baiting Place, Farmingdale, N. Y.

CIRCLE 466 ON READER-SERVICE CARD

**CLOSED-CIRCUIT TV.** New brochure describes TV microscope system (Model VTMS-1) for research and teaching.—Video Engr. Co., Inc., Riggs Rd. at First Place, N.E., Washington 11, D. C.

CIRCLE 467 ON READER-SERVICE CARD

**NUCLEAR INSTRUMENTS.** 64-page Catalog F describes counting systems, scalars, spectrometers, ratemeters, detectors, etc.—Tracerlab, 1601 Trapelo Rd., Waltham 54, Mass.

CIRCLE 468 ON READER-SERVICE CARD

**CARDIOVASCULAR PRODUCTS.** 16-page Supplement No. 1 presents data and prices of needles, syringes, stopcocks, adapters, etc.—Becton, Dickinson and Co., Rutherford, N. J.

CIRCLE 469 ON READER-SERVICE CARD

**RADIOCHEMICALS.** 12 data sheets include information on applications, properties, formulas, and references on series of radiochemicals.—Tracerlab, Inc., 1601 Trapelo Rd., Waltham, Mass.

CIRCLE 470 ON READER-SERVICE CARD

**MICROTITRATION.** 4-page bulletin describes new Microtiter Kit and technique for viral serological investigations.—Cooke Engr. Co., 735 N. St. Asaph St., Alexandria, Va.

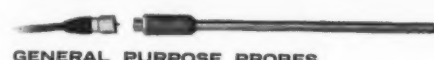
CIRCLE 471 ON READER-SERVICE CARD

## NEW UNIQUE . . .

## THERMISTOR PROBES



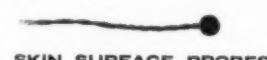
NEEDLE PROBES



GENERAL PURPOSE PROBES



SPECIAL CATHETER PROBES



SKIN SURFACE PROBES

Now available, a wide variety of precision thermistor probes for fast accurate temperature measurements in virtually all medical research and clinical applications.

- Fast response
- High accuracy
- Long-term reliability
- Precision engineered
- Special probes made to order; call or write for further information on this highly specialized service.

Factory trained representatives are located throughout the United States.



**Waters** electro-medical instruments

THE WATERS CORPORATION

ROCHESTER, MINNESOTA

CIRCLE 41 ON READER-SERVICE CARD

Write for Bulletin TP-1/61

**LAB FURNITURE.** 4-page bulletin describes modular wooden cabinets, cupboards, bases, etc.—Emil Greiner Co., 20 N. Moore St., New York 13, N. Y.

CIRCLE 472 ON READER-SERVICE CARD

**LAB INSTRUMENTS.** 16-page Lab-items includes electronic resistance thermometer, gas chromatography, microscopes, stirrers.—Emil Greiner Co., 20 N. Moore St., New York 13, N. Y.

CIRCLE 473 ON READER-SERVICE CARD

**COLUMN CHROMATOGRAPHY.** 6-page brochure describes Volumatic Series fraction collectors for volumetric, and time and drop collection.—Vanguard Instrument Co., Box 244, La Grange, Ill.

CIRCLE 474 ON READER-SERVICE CARD

**CONDUCTIVITY BRIDGE.** Bulletin 3216 B-04 describes apparatus for measuring conductivity of solutions.—LKB Instruments, Inc., 4840 Rugby Ave., Washington 14, D.C.

CIRCLE 475 ON READER-SERVICE CARD

**OXYGEN REGULATORS.** 20-page Catalog 10 describes regulators, flowmeters, humidifiers, etc.—National Welding Equipment Co., 218 Fremont St., San Francisco 5, Calif.

CIRCLE 476 ON READER-SERVICE CARD

**TELEMETERING.** Two reprints describe 2.5-oz. transmitter used to track pigeons, study homing instincts.—American Electronic Laboratories, Inc., Richardson Rd., Lansdale, Pa.

CIRCLE 477 ON READER-SERVICE CARD

**TOURNIQUET.** 4-page brochure describes Alternating Tourniquet which includes pressure regulators, pneumatic pump, automatic programmer, and velcro-faced cuffs.—Cordis Corp., 241 N.E. 36 St., Miami 37, Fla.

CIRCLE 478 ON READER-SERVICE CARD

**SCINTILLATION CRYSTALS.** 12-page bulletin describes characteristics, applications, and forms of scintillation crystals.—Isomet Corp., 433 Commercial Ave., Palisades Park, N. J.

CIRCLE 479 ON READER-SERVICE CARD

**OPTICAL CRYSTALS.** 8-page Bulletin 157 and price lists describe applications of synthetic prisms and lens elements for ultraviolet and infrared microscopy.—Isomet Corp., 433 Commercial Ave., Palisades Park, N. J.

CIRCLE 480 ON READER-SERVICE CARD

**CELL COUNTER.** Brochure describes Model B Research Counter and automatic cell size distribution plotter.—Coulter Electronics, 2525 N. Sheffield, Chicago 14, Ill.

CIRCLE 481 ON READER-SERVICE CARD

**NEUROPHYSIOLOGICAL MEASUREMENTS.** Data sheet describes ultra-high input impedance unity gain BAK Amplifier.—Cooke Engr. Co., 735 N. St. Asaph St., Alexandria, Va.

CIRCLE 482 ON READER-SERVICE CARD

**STABLE ISOTOPES.** 4-page reprint and two price lists present information on new uses of nitrogen 15, oxygen 18, and deuterium.—Isomet Corp., 433 Commercial Ave., Palisades Park, N. J.

CIRCLE 483 ON READER-SERVICE CARD

## ELECTROPHORESIS:

# 20 TIMES FASTER

TRIPLES ACCURACY  
TRIPLES RESOLUTION

## MICROPHONE

## ELECTROPHORETIC SUPPORT

**ACCURATE** The uniform pore structure of Microphone gives fast results that are reproducible within 1% from strip to strip.

**NO TAILING** Compounds separate into very sharp zones on Microphone with no tailing or overlapping. Separation is so complete that individual bands may be cut out and dissolved for further investigation.

**FAST** Microphone's accuracy is so dependable that several portions of the same sample may be processed simultaneously with different tests run on each strip. Complete separation, staining, and evaluation can be finished in less than an hour.

## SURPASSES ELECTROPHORESIS PAPER IN ALL RESPECTS

**Extra Broad Scope.** Microphone separates compounds impossible to separate on paper—including lipoproteins, globulin, lysozyme, and other macro molecules.

**Separates Microsamples.** Only a 2 gamma sample of protein is required to produce recognizable patterns.

**Strength.** No fear of tearing. Easy to stain and transfer. Microphone is a plastic, equally strong when wet or dry.

**Transparency.** Simple technique makes Microphone transparent for easy evaluation. Light transmission is 5 times more uniform than with paper.

**Inert and Nonabsorbent.** Microphone is chemically inert to the separating substances, and sample absorption is negligible.

Send for details of special trial offer.

**GELMAN**  
INSTRUMENT COMPANY

P. O. Box 118-M, Chelsea, Mich.

CIRCLE 42 ON READER-SERVICE CARD



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## EVENTS

### March 8-10

10th Annual Scientific Meeting: Symposium on Information Storage and Neural Control, sponsored by Houston Neurological Society and Dept. of Neurology of Baylor University School of Medicine, Texas Medical Center, Houston, Texas. For information, contact William S. Fields, M.D., Houston Neurological Society, 1200 M.D. Anderson Blvd., Houston 25, Texas.

### April 11-13

SWIRECO Conference, sponsored by Houston Chapter of IRE, will include one day of papers on Biomedical Engineering, including patient monitor systems. For information on sessions and submitting papers, contact L. A. Geddes, Dept. of Physiology, Baylor University College of Medicine, Texas Medical Center, Houston, Texas.

### April 16-18

42nd Annual Meeting and Exhibit, American Association for Thoracic Surgery, Chase Hotel, St. Louis, Mo.

### May 15-16

4th Annual Council on Medical Television Meeting, sponsored by Institute for Advancement of Medical Communication, Clinical Center, N.I.H., Bethesda, Md. Contact John F. Huber, M.D., Chairman, 33 E. 68 St., New York 21, N. Y.

### May 16-17

Navy Medical-Dental TV Workshop, National Naval Medical Center, Bethesda, Md. (The meetings of the Council on Medical TV and the Navy TV Workshop have been scheduled consecutively to coordinate a more comprehensive seminar.)

### SECOND ANNUAL SAN DIEGO SYMPOSIUM AND EXHIBIT ON BIOMEDICAL ENGINEERING

The Second Annual San Diego Symposium and Exhibit on Biomedical Engineering will be held at the Stardust Motor Hotel, San Diego, California, June 20-22, 1962.

This year's meeting is being sponsored by Inter-Science; the San Diego U. S. Naval Hospital (largest in the world); the San Diego County Medical Association; the AIEE—Committee on Electrical Techniques in Medicine and Biology; the IRE—Professional Group in Medical Electronics; the University of California at San Diego; Simulation Councils, Inc., and the Astronautics Division of General Dynamics.

A call for papers has been made by the program committee of Inter-Science, 8484 La Jolla Shores Drive, La Jolla, California.

**PROSPECTIVE SPEAKERS ARE REQUESTED TO SEND FULL-LENGTH DRAFTS OF THEIR PAPERS TO THE PROGRAM COMMITTEE NOT LATER THAN 1 MARCH 1962.**

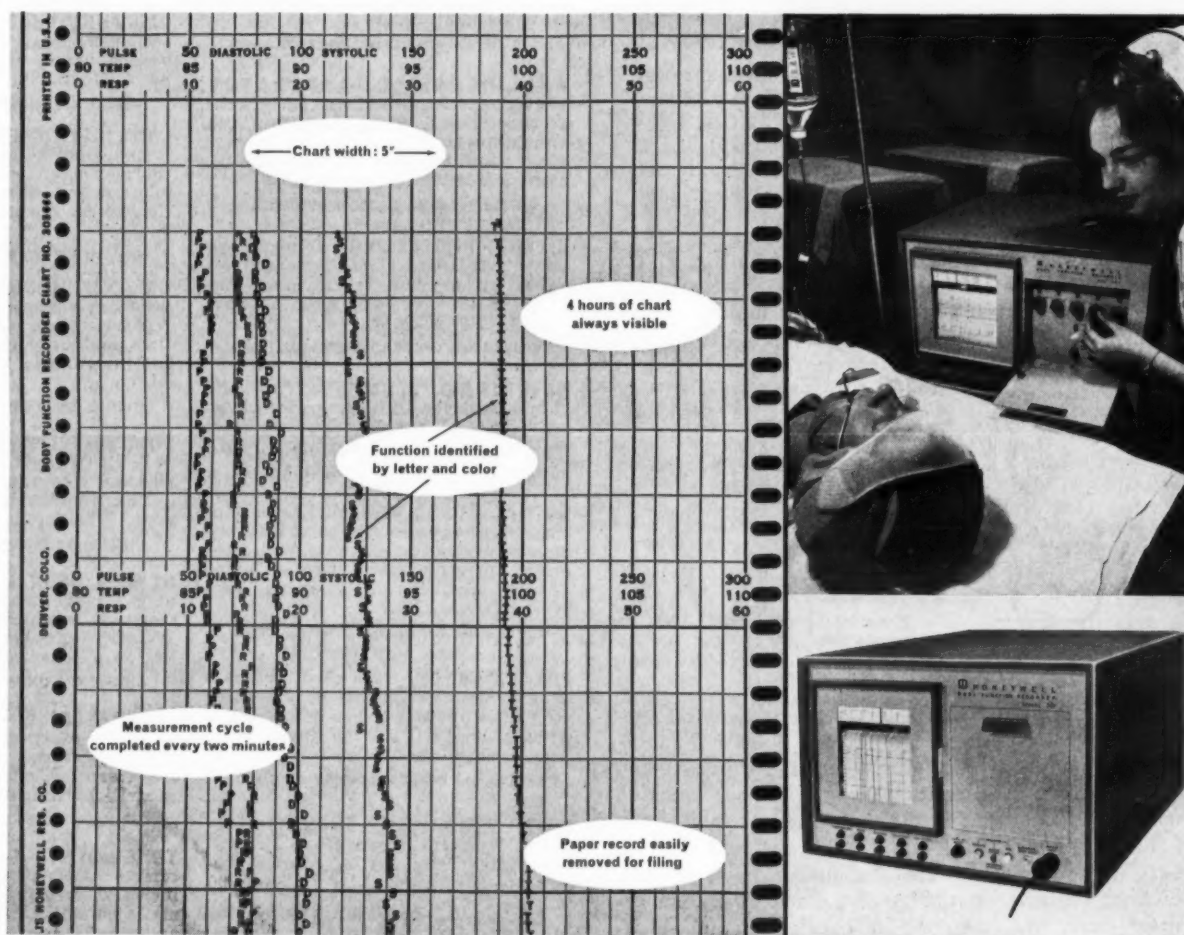
The technical program of the Symposium, the theme of which is "Interdisciplinary Cooperation," will cover the following areas:

- (1) Medicine and biology, where advances have been made possible by techniques or equipment of the physical sciences and engineering.
- (2) Those aspects of the physical sciences and engineering which are applicable or closely related to medicine and biology, for instance the simulation of biological functions, neural models, "intelligent" machines, and bionics.

Proceedings will be printed and mailed to all registrants within 6 weeks after the symposium.

There will be exhibits, primarily in the areas of instrumentation and new types of laboratory equipment. Workshops are planned, on a non-conflicting basis with the Symposium sessions, to explain the use and application of devices exhibited.

The exhibit will be under the management of Richard Rimbach Associates, and detailed information and exhibit space reservations can be obtained by writing to 845 Ridge Avenue, Pittsburgh 12, Pa.



## For constant, reliable patient surveillance... depend upon the Honeywell Body Function Recorder

Specifically designed to monitor the condition of critically-ill and post-operative patients, the Honeywell Body Function Recorder automatically measures and records changes in body temperature, pulse rate, respiration rate, systolic and diastolic blood pressure. Medical authorities familiar with the special requirements for intensive care agree that the relative behavior of these physiological functions provides an accurate picture of the patient's overall condition.

Among the many other important features of this unique instrument are these:

**Unitized Headpiece:** The only parts of the instrument to come in contact with the patient are within or are attached to the cushioned headpiece, fitted to the patient in less than a minute. All wires are contained in a single cable which provides quick connect or disconnect and exceptional patient mobility.

**Alarm System:** As each function is measured, it is compared to upper and lower limits pre-set according to the

doctor's instructions. Passing these limits actuates appropriate alarms.

The Honeywell Body Function Recorder thus releases the nursing staff to perform uniquely human tasks. At the same time, it provides a tireless continuity of accurate patient surveillance that is actually beyond human capabilities.

The components of the Body Function Recorder are designed for central station installation as well as bedside monitoring of individual patients.

For complete information, contact Minneapolis-Honeywell, Electronic Medical Systems, 5200 E. Evans Ave., Denver 22, Colorado.

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